

# Railway Age Gazette

Including the Railroad Gazette and the Railway Age

PUBLISHED EVERY FRIDAY AND DAILY EIGHT TIMES IN JUNE, BY THE  
SIMMONS-BOARDMAN PUBLISHING COMPANY,

83 FULTON STREET, NEW YORK.

CHICAGO: 417 South Dearborn St. CLEVELAND: Citizen's Bldg.  
LONDON: Queen Anne's Chambers, Westminster.

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Subscriptions, including 52 regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free:

United States and Mexico.....	\$5.00
Canada.....	6.00
Foreign Countries (excepting daily editions).....	8.00
Single Copies.....	15 cents each

Engineering and Maintenance of Way Edition and the four Maintenance of Way Convention Daily issues, North America, \$1.00; foreign, \$2.00.

Entered at the Post Office at New York, N. Y., as mail matter of the second class.

VOLUME 53.

OCTOBER 18, 1912.

NUMBER 16.

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#### GENERAL NEWS SECTION.....

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THE baggage cushion described in another column may be said to recommend itself at sight. Possibly it may not be of just the right proportions to suit everybody, but the idea is attractive. A mat of suitable thickness would be very useful on all station platforms where trunks are unloaded from cars. Why should not every station have two or more of them? At any rate, it is to be admitted that the use of skids for this purpose has never been enforced in any satisfactory degree. Neither can a baggageman be depended on to obey the rule against rough handling, either with or without a skid, when the conductor is urging him to hurry and there is no brakeman in sight. With the small train crews now common, it often happens that there is no brakeman available, and the "drop test" is applied to hundreds of trunks every day, almost of necessity. And yet the rule that trunks shall not be bumped is a most reasonable one. Where a trunk or its contents suffers from rough handling, a damage bill, even if promptly and cheerfully settled—which is not often the case—is not an adequate remedy. The annoyance suffered by the passenger is of that kind which cannot be paid for in money. He is entitled to good service; neither apology nor reparation can take the place of that.

FRANK H. FUNK, Progressive candidate for governor of Illinois, is quoted as having made in a recent speech "a strong plea for the farmer vote." "I want to reassure you," he is reported to have said, "that I shall appoint a farmer and stockman to the railroad and warehouse commission. These two great interests in Illinois are entitled to representation on this important state commission." The quotation does not make clear whether Mr. Funk meant he would appoint a farmer and a stockman, or whether he intends to combine the representation of "these two great interests" in one appointee. At any rate there are other large interests in Illinois, all more or less interested in the character and work of the railway commission. Not the least of these are the railways themselves and their employees. There are only three railway commissioners. We have not yet heard of Mr. Funk promising the appointment of a railway officer, or even a railway employee to catch the numerous votes of the latter class. Would a railway officer or employee be more likely to render pro-railway or pro-railway-employee decisions than a farmer would be to favor the agricultural interests as against those of the railways and the rest of the public? The abolition of the Commerce Court was attempted because its members, or some of them, were suspected of being too susceptible to the railway point of view. Would a pro-farmer decision participated in by a farmer member of a railway commission be a proper subject for the same kind of agitation? A state railway commission is, as Mr. Funk says, an important institution. It acts in a judicial capacity. Politicians do not usually promise, publicly at least, to appoint representatives of certain special interests to the bench. When judges are appointed the reasons given to the public usually concern their qualifications and integrity. Why should the case be different with railway commissioners? The sort of "progressiveism" that by implication promises railway commissioner-ships in exchange for votes, and suggests the use of railway commissions for the benefit of special interests, bears a strong resemblance to certain forms of reactionaryism that are the objects of jeers and denunciation from sources with which Mr. Funk is extremely well acquainted.

IT is an interesting anomaly of railway operation that whenever traffic becomes heavy the construction of additional main tracks, yards and other facilities, which interferes more or less with the operation of trains, is increased, adding greatly to the difficulty of handling either the traffic or the construction. While the railway managements usually know where they will be congested before the congestion comes, they often delay while the traffic could stand more or less interference without great inconvenience and then begin to tear up facilities when

business becomes heavy in an endeavor to save themselves from being swamped, but in reality adding to the confusion. The most expensive construction work is that done during periods of great business activity when labor and material are high and are difficult to secure at any price, while the cheapest and most satisfactory work can be done when the traffic is light. The large amount of construction work usually carried on during seasons of heavy business adds very materially to the congestion of traffic, not only because it interferes with its movement, but also because the large quantities of materials for railway work that must then be moved add greatly to the amount of traffic that must be handled. As this traffic increases the difficulties of handling construction work multiply until the time arrives when it becomes necessary to shut down the construction work entirely, even though improvements may be badly needed. Several instances occurred within the past month where it has been necessary to practically abandon the construction of additional main tracks, although, if the improvements had been completed, traffic could have been handled much more readily. The difficulties of handling construction work in times of heavy traffic may in general be divided into two classes. In the first place the presence of work trains, of which some are necessary in nearly every case, is a cause of delay to revenue trains, which from the very nature of the case cannot be avoided. As the number of revenue trains increases, the time lost by the work trains lying on sidings becomes so large a part of their total time that it finally becomes advisable to withdraw them entirely. In the second place, when traffic is heavy there is usually a shortage of power as well as of crews, and this makes it necessary to assign the engines to hauling revenue freight, even though it stops improvements which are much needed. While work trains may be cut down to a minimum their services are required in handling bridge material, track material, etc., unless very heavy charges are incurred for hauling material by teams from the nearest sidings. At the present time one road on which work train service has been withdrawn is hauling bridge and culvert material distances of four and five miles by wagon to avoid shutting down the work entirely. The most important lesson to be drawn from the conditions now existing is the penalty attached to letting needed improvements go until the last moment, and then being unable to use them when needed, or being required to turn them into service before they are in proper condition. If many of the improvements now being made had been made during the dull years since 1907, better labor could have been secured at wages lower than those paid now, prompt deliveries of material could have been obtained and the business of the railways and the country as a whole would have been materially strengthened. As things are, many construction engineers are working under a severe handicap, the cost of their work is exceeding the estimates, and because of the pressure for facilities they are turning tracks over to the operating department with insufficient ballast to support them, and on the whole, in a generally unsatisfactory condition.

#### THE EFFECT OF THE AUTOMOBILE ON RAILWAY TRAFFIC.

A FEW years ago steam railway officers were considerably exercised on account of the actual and prospective inroads on their passenger business caused by the rapid development of the network of electric interurban railways, with their smokeless, frequent service and low fares. Many railway officers are now alarmed because of the effect of the automobile on their passenger business. While some have deemed it too insignificant or inevitable for serious consideration, others have investigated the subject and have been able to trace distinctly appreciable losses in earnings to the increasing popularity of the automobile. While difficult to measure, these losses are felt in the earnings from local, short haul business, and also in those from long haul business because many people in comfortable circumstances, who formerly took

summer vacations involving railway journeys, now take their recreation either in the form of motor tours or in daily pleasure riding.

A comprehensive investigation of the subject has been made by the Union Pacific, much of whose road lies in a prosperous territory, the physical conformation of which is especially adapted to the use of the automobile. During the summer of 1911, in order to ascertain to what extent, if any, the use of automobiles was affecting local travel, Gerrit Fort, passenger traffic manager, addressed an inquiry to all agents on the Union Pacific and Oregon Short Line, and also questioned the principal wholesale houses in the territory of the two roads. This inquiry developed that exclusive of Kansas City and Omaha, but inclusive of Denver and Salt Lake City, there were 19,004 automobiles of private ownership along the two lines, 15,497 of which were on the Union Pacific and 3,507 on the Oregon Short Line. In addition there were 984 cars kept for rent. The average carrying capacity was probably five. While various other reasons were assigned for the decrease in passenger traffic experienced by the western lines that year a very large proportion of the agents of these roads mentioned automobiles as among the important contributing causes. Out of 50 replies from agents on the main line through Nebraska, 17 did not think that automobiles had affected the earnings, while 33 said that they had affected the local revenue, the estimates as to the amount of the effect varying from "slightly" to "50 per cent. of the local sales." In Kansas out of 45 main line agents 14 stated that the short haul business was being seriously affected by automobiles. In Colorado 16 out of 27 agents estimated the effect from slight to one-third of the local business. In Wyoming 24 out of 31 thought that automobiles had had no perceptible effect on revenues, while 7 believed that their business was reduced. On the Oregon Short Line the general opinion was that the automobiles had not yet perceptibly influenced local traffic.

The reports stated that the owners of machines used them to make short trips to neighboring towns, and carried with them people who would otherwise use the trains. An agent at a small town in western Nebraska said that on July 4 he sold 112 tickets to Lodge Pole, Neb., and that fully as many persons went in automobiles. As the round trip fare between these stations is 40 cents the company lost by automobile competition \$45 or \$50. An agent at Brighton, Colo., stated that automobiles were affecting the local revenue at his station to the extent of \$150 a month. The agent at Granite Canyon, Wyo., said that six automobiles were bought in his territory during the season, and his local sales for June dropped 35 per cent. and that most of the ranchmen in his vicinity intended purchasing automobiles.

Reports from shippers showed that many houses had bought automobiles for their salesmen, and that others contemplated doing so. The agents who found their station earnings affected stated that commercial men were using automobiles extensively, and often joined together in hiring them, figuring that the difference between the cost of renting a machine and the railway fare was more than offset by their ability to cover more territory in a given time, especially in localities served by only one or two trains a day.

Even in territory where there may be several trains a day automobile owners have found that they can frequently keep appointments and transact business within a radius of 10 to 25 miles far more conveniently, and with a considerable saving in time, although, of course, at far greater expense, by automobile than by train.

P. S. Eustis, passenger traffic manager of the Burlington, also canvassed his agents during the summer of 1911 for an explanation of the temporary diminution of ticket sales. While a large number ascribed it to the poor crops of that year, a large proportion were able to specify several ways in which the increasing use of the automobile was cutting into the passenger receipts. For example, one agent reported that

the ticket sales from his station to a town 14 miles away during the Chautauqua meeting showed a large reduction as compared with the previous year, although the attendance at the meeting was larger. During the year the number of automobiles in his town had increased by 25.

Although the summer of 1912 was far better from the passenger traffic standpoint than that of 1911, that the effect of the automobile is rapidly and steadily increasing is demonstrated by reports gathered by the Union Pacific in August, 1912. These showed that there are now upward of 25,000 automobiles in Nebraska, 18,600 in Kansas, 18,000 in Colorado, 1,500 in Wyoming, 2,300 in Utah and 1,500 in Idaho. That is, there is one automobile for every 47 inhabitants in Nebraska, one for every 90 in Kansas, one for every 44 in Colorado and one for every 97 in Wyoming. Undoubtedly, therefore, the passenger earnings of the railways are being, and will continue to be, more or less seriously affected. Moreover, the effect of the automobile is felt particularly in the earnings of branch lines where the traffic is hardly sufficient to justify an increase in service, and where the loss of business renders it more difficult to meet the expense of a train or two a day.

With the improvements in country roads and in the design of motor trucks there is also growing up a competition with the railways in the handling of freight for short distances, particularly in congested terminal districts. In an article in the *Railway Age Gazette* for September 20, page 510, it was shown that the E. R. Ladew estate of Glen Cove, L. I., is successfully operating motor trucks between its factory at Glen Cove and its New York warehouse, and is not only handling its own products with a saving of time and freight rates, but is carrying small shipments for others in competition with the railway. Some of the large department stores in Chicago have for several years used their own auto-trucks for the delivery of packages in the outlying suburban territory in preference to paying express rates. Many other instances have been noted where short haul freight transportation formerly handled by railway has been captured by the motor trucks. It was recently estimated that from the inception of their manufacture up to 1911 \$60,000,000 worth of motor business vehicles had been sold. In Massachusetts the records show about 3,500 commercial vehicles licensed since January 1, 1912, and in New York the automobile bureau of the department of state reports 8,278 registrations of commercial vehicles this year, with from 80 to 250 being added each week.

It is difficult to see how the railways can expect to meet the competition of automobiles either for freight or for passenger transportation in such circumstances as those in which its greatest development has been shown to have taken place. As far as passenger service is concerned it may be found that the use of the self-propelled motor car, which has often proved an effective offset to electric line competition, is adapted to meet the conditions; and it may also be found useful in some cases for short haul freight transportation.

The optimistic view of the whole situation, however, is that both the automobile and the motor truck are agencies of transportation that make for good roads and better conditions of living, which will ultimately be helpful to the railways as well as to others. The railways certainly are vitally interested in road improvement; they derive large earnings from the shipment of automobiles, and if the traveling salesman is able to sell more goods by their use the railways will surely profit as a result. At the same time it is not unlikely that the increased use of automobiles will have a tendency to slacken the building of interurban trolley lines. A few years ago it was thought that the extension of long distance telephone service would affect travel, but it is now generally recognized that while a telephone message very often saves a railway trip, in innumerable instances engagements are made over the telephone which cause travel or transportation

which would not otherwise take place. As for motor truck freight transportation, its success as a competitor of that of the railways has been mainly determined by individual or local factors, and it has furthermore been greatest in the vicinity of large cities where it has probably relieved the railways of some of their most expensive and least profitable traffic.

#### NEW BOOKS.

*Freight Terminals and Trains.* By John A. Droege, Superintendent of the Providence Division of the New York, New Haven & Hartford Railroad. Published by McGraw-Hill Book Company, New York. 465 pages. 6½ in. x 9½ in. Cloth. Price \$5.

This is a book by a division superintendent telling of his own kind of work. The division superintendent is, in many respects, the most important man on a railway. If he is not fit for his job there will be a definite deterioration in the quality of the service, and, in the words of a veteran president, any superintendent of a division who has held his place five years *must* be a suitable man; if he were not competent he would have been crowded out in less than that time. The author of this book can therefore be vouched for as one who knows his subject; and the reader soon finds that he not only is well acquainted with everything of which he speaks, but that he knows how to describe things in an attractive manner.

The book, confined to yards and terminals, which was published six years ago, has been so enlarged and amplified as to be practically a new work. The present volume is really a treatise on freight transportation. All of the important things which come before a superintendent, except the passenger service and except also those general dealings with the public which cannot be classified, are here dealt with, and in most cases with admirable fulness. The headings of the principal chapters will give the reader a fair idea of the scope of the work: General requirements of terminal design; classification yards; operation of yards; the yardmaster; management and discipline; loading cars; making up trains; time freight service; team delivery yards; live stock handling; weighing freight; waterfront terminals; coal piers and storage plants; ore and lumber docks; grain elevators; freight houses; transfer stations; mechanical handling of freight; the freight agent; operation of freight houses; refrigerating, ventilating and heating; the engine house; engine coaling plants; ash and sand plants; and the engine house foreman. In addition to these, one of the longest chapters, that on track construction and maintenance details, is by Professor C. B. Breed, of Massachusetts Institute of Technology, and another, giving an account of freight service in Great Britain, is by Professor W. J. Cunningham, of Harvard University.

Taking up any one of these chapters, the reader will at once see that the author is a thorough and businesslike student of his subject. He shows that he is speaking from actual experience, by his frequent reference to the obstacles and difficulties which the responsible railway officer is constantly encountering, and by the aptness of his illustrative stories. He shows his breadth of grasp and the care and insight with which he has investigated his field by the variety and appropriateness of the descriptions which he introduces of freight houses, freight yards, docks and other features in all parts of the United States. The chapter on mechanical handling of freight includes illustrated descriptive matter concerning the new station of the Missouri, Kansas & Texas, recently built in St. Louis, electric motor storage-battery freight trucks, and the elevators (used principally by steamships where vessels have to lie at different heights as compared with the height of a dock) by which heavily loaded hand trucks are propelled up inclined planes. Throughout the work statistics of cost are given, making the volume a valuable book of reference.

## Letters to the Editor.

### ANOTHER LETTER FROM PRESIDENT W. G. LEE ON RELATIONS OF RAILWAYS AND EMPLOYEES.

CLEVELAND, Ohio, October 10, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Your issue of October 4 continues the discussion started August 23 by the general manager who advocated placing the superintendent in absolute control of the men on his division, without the right of appeal to any one, and giving to the general manager the right to abrogate all wage agreements and put others into effect on a ten-hour basis. The controversy has produced one excellent result, in that it has brought out another demand for the same power from an official further down the line, as is shown by the communication in your issue of October 4, page 622, signed "Master Mechanic." This time it is a lesser official who stands for the suggestion, with the difference that he believes it not good business to give the authority to the superintendent because "he is not capable of judging the ability of an engineer." His contention is that the master mechanic is the only person who has sufficient ability to do so, because he has been educated along mechanical lines. This might be an excellent argument if the engine never left the roundhouse, but it does, and mechanical ability, while good in its place, does not wholly operate railroads.

This master mechanic, of course, is opposed to the engineers' brotherhood. He demands unquestioned authority to deal with the engineers because, as matters are now handled by the general manager, "many concessions are not practical from a mechanical standpoint." The master mechanic is guilty of the error of judging everything from a mechanical point of view. Men are involved in this discussion, and are just as much a part of it as the engines, although the master mechanic has overlooked this most important fact in his hurry to get before your readers with his proposed "revolution"; for that is what it would mean if lesser officials, with as little regard for the responsibilities of authority as he has, were given the absolute management of their men.

This type of official is too common for the general good of the service. While he furnishes ample evidence for their need, he does not understand that the reason for the organizations he detests is to be found in exactly such officials as he shows himself to be. The blind, unreasoning, absolutely self-perfect and all-powerful type that he wants to be, who could with a wave of his hand dismiss any employee who did not suit and who would not hear any reasons why he should do otherwise, went out of date years ago. His going, like whisky, was necessary for the good of the men and the service. This survival of the "dark ages," who now demands that he be restored to his throne, ought to quit making raucous noises long enough to hear what is going on in the world today and have the good sense to pay attention to it.

And this perfect one, who declares a superintendent unfit to manage an engineer, takes his fling at seniority in a way that shows he either does not know what it means or that he sets facts aside to make way for his prejudices. Officials of his type are responsible for seniority, because they abused the right to promote men by promoting, not men entitled to it, but those who paid for promotion in some way or another, or were friends of the "family." The deserving man was promoted only when there was no one else to promote. The organizations came as a result and did protest this unfair way of rewarding men for good service and insisted "that all things being equal, the oldest man in the service be promoted." This ruffled and peeved the man from whose decision there had been no appeal. What is the honest objection to seniority? The companies do not promote men who cannot pass examination. If they do pass—and the officers are the judge of their fitness—they are entitled to promotion.

This master mechanic grows very facetious and says that seniority places a man in a position he is about as capable of filling "as a billy goat of singing tenor in a church choir." In so doing he confesses his lack of understanding of seniority. He doubtless is an excellent judge of the vocal abilities of a billy goat, and that seems to complete the range of his understanding as applied to railway operation.

Then he struts about to tell how engineers ought to be in the pen for wrecks for which they were at fault. He ought to be fair and demand the imprisonment of officials who overlook reported repairs, purchase defective rails, use track and road bed too long before repairing, neglect equipment and cause injury and deaths of passengers and employees. This sort of discussion is without purpose and does nothing to better the situation of which he complains. It simply intensifies what is bad and offers nothing that is good or worth while.

Not to be either mean or personal, but to show how little this master mechanic knows of his subject, I quote a part of his letter on page 622, wherein he says:

Railway officials periodically rush into print with interviews wherein they deplore the spread of anarchy, socialism, etc. I make the statement, and defy it to be satisfactorily contradicted, that railway officials themselves, by reason of their actions, are alone responsible for what they believe to be the appalling conditions that confront them. The man who belongs to an organization can get what he wants, either in the way of an increase in wages or better working conditions, but the man who is unfortunate enough not to be affiliated with an organization must take what the company sees fit to mete out to him in the way of wages, or work amidst such surroundings as the company provides, no matter how uncongenial they may be, bearing in mind, of course, that he has one more privilege than a soldier, that of resigning. The man with the organization back of him, if discharged, has all the influence and power of his organization to secure his reinstatement. The man who is not so fortified is dismissed on the slightest provocation and there is no one to plead his cause. In other words, railway officials, while deprecating the spread of anarchy, socialism, unionism and organization, do nothing but cater to the men who are organized. For railway officials to learn to tote as fair with the men who are not members of a labor organization as with men who are members, will do more to promote harmony and dispel dissatisfaction than anything I know of.

What is this but an open acknowledgment that railway officers will not deal fairly with men who are not in the railway organizations? He says, "The man who is not so fortified is dismissed on the slightest provocation and there is no one to plead his cause."

No stronger plea could be made to the man out of organization to get into it if the subject were discussed for a thousand years. It is a confession of taking advantage wherever opportunity offers. Yet he asks for absolute authority to do what he says is wrong, for he admits officials "will not tote fair" where there is no organization.

Aside from this the only question of interest is in his demand for authority and the willingness to shift responsibility. The general manager was willing to shift it, the master mechanic demands his share of it and goes quite some needless distance to prove his lack of ability to assume it if he were given it.

A railroad is not all confined to the machine shop or the roundhouse; it goes beyond the turntable, although our master mechanic does not seem to understand it. Its administration goes right into the office of the president for the last word when it is necessary. The day of the unquestioned authority of every official, big and little, has departed. The right of appeal, against unfair decision is recognized everywhere and in every business. The official who attempts to prejudice and intensify a distorted situation, and stands for a return to the conditions of other days before organizations of employees were forced to insist on decent treatment and the right of appeal, and proves his argument by the statement that "where there is no organization, the man has no chance," merely argues for authority and proves he has not sufficient ability to exercise it.

He ends his discussion by saying, "A revolution is bound to come, so let's 'revolute' and be done with it." The official, whether corporation or labor, who invites revolution has something to learn. The first lesson for him is that the industrial

world reaches out far beyond his dwarfed notions of upsetting everything on the chance of rebuilding something better on the ruins. The demand for a revolution in the way of doing business with employees, followed by an appeal for a greater *esprit de corps*, is about as inconsistent as the demand for absolute authority for the master mechanic, when by his own argument he admits he is wrong and would abuse authority if it were given to him.

When an official desires to criticize the railway labor organizations he ought to keep track of himself and not argue for them. It is forcing himself to be honest against what answers for his will.

W. G. LEE,

President, Brotherhood of Railroad Trainmen.

#### TENDER DERAILMENTS.

EL PASO, Tex., October 2, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring to the discussion by Mr. Summers of "A Fortunate Wreck," page 569 of your issue of September 27, Mr. Summers' deductions are based upon assumed defective track and that the tender trucks always leave the track on the side on which the assumed high or low spot in the rail is found. There is nothing in the discussion to prove that these assumptions are correct for the specific case or for any other case.

In the case under consideration, it is altogether probable that the track was not torn up at the point where the tender trucks left the rails, and an examination of the track at that point would have been more conclusive than a theoretical discussion.

It has been the experience of the writer and many other railway men that tender trucks have persisted in leaving the rails in many cases where the track was not torn up, no other wheels derailed, and careful inspection of the track failed to reveal any track defects explaining the derailment.

For a number of years the El Paso & Southwestern was troubled with many derailments of high square tenders of the general design shown in the photograph of the tender derailment under consideration. The whole trouble was finally removed by discarding the tenders in use and substituting tenders having long low semi-circular water tanks. Our derailments of such tenders are as rare as that of any other rolling equipment on the road. The trucks of these new tenders are not specially designed.

J. L. CAMPBELL,

Engineer Maintenance of Way, El Paso & Southwestern.

RICHMOND, Va., October 9, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring to the editorial in your September 27 issue; also to the communication from E. W. Summers in the same number on the subject of tender derailments:

I am really surprised to hear you say that in spite of the study and examination of the many accidents of that character, that there is still much to be desired in the way of improvement. While I was general superintendent of motive power of the Chesapeake & Ohio there was a period in 1906 and 1907 when we had a number of tender truck derailments. We of the motive power department claimed that as no material changes had been made in the truck arrangement of our tenders, the derailments were due to bad track and high speed. The derailments invariably occurred on parts of the road where the track was known to be "soft" and were confined to three districts.

Using identically the same type of tender on other districts where the track conditions were more substantial, we had no derailments. Therefore we had the evidence, as we saw it, to bear out our conclusions that the derailments were due to bad track. But the derailments continued and while the track might be put in first class line and surface today, it did at times, due to its newness, get out of line or surface the next day with a consequent possible derailment. We therefore concluded that it was our duty to find what could be done to avoid derailments, even though the track was out of surface or line.

We made a cheap wooden model to represent the tender tank and frame, the truck and the track. Our tender side bearings were spaced 56 in. center to center. Locating the center of gravity in the model representing the tender tank, and placing a thumb tack at that point, from which was suspended a piece of cord, we found that by moving the cord from a vertical position (under a slight pull which brought the three parts of the model firmly together) to a position which brought it through or over the rail, the wheel flanges on the opposite side were invariably raised above the rail. We then reduced the distance between side bearings until we arrived at a point where the thrust of the tender frame on the truck side bearings would not lift the wheels off the rails and which we found to be 36 in. center to center with  $\frac{1}{8}$  in. vertical clearance between the side bearings. We at once made these our standard dimensions and put a stop to tender truck derailments.

The same dimensions have been adopted by a number of neighboring roads, as well as roads in other parts of the country, with the result that it put a stop to derailment of tender trucks on those roads.

To cause tender truck derailments requires a combination of high speed, uneven track and wide spacing of side-bearings. When track conditions are good or speed is low it does not matter how widely the bearings are spaced.

J. F. WALSH,  
Mechanical Expert.

#### WHY MANY AMERICANS SEE EUROPE FIRST AND OFTEN.

LOUISVILLE, Ky., September 28, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The movement by our transportation companies, hotel owners and others, with the slogan "See America First," should be accompanied by a study of the relative comforts and expense of trans-Atlantic travel as compared with touring America. Having seen America first and a goodly portion of Europe second and third, I am inclined to visit Europe fourth and fifth and to "see America" never again, although a proud and patriotic American. There are Americans of refinement and culture and other Americans who aspire to acquire these things, most of us of small or moderate means, who find that we can have more comfort and enjoyment in Europe than in America.

In Europe we find low-priced hotels where the service is clean and good and the surroundings desirable. In America low-priced hotels too often mean the reverse. In Europe we find quiet, inexpensive and highly respectable restaurants. In America we find slamming and rattling of dishes, noise, confusion and costly luxury. In European hotels we find neatness, quiet and order. In American hotels we find whistling bell boys, yelping messenger boys howling through the dining-rooms with messages for Mr. Get-Rich-Quick, baggage-smashing, noisy porters, with swagger, bluster, and offensive cuspidors in the lobbies.

Recently in a leading American hotel in a leading city I had a room on the fifth floor, fronting over the main entrance. At midnight and through two succeeding hours sleep was impossible because of the noisy chatter and boisterous conduct of cab drivers about the entrance to the hotel. Repeated polite requests to the clerk over the telephone from my room to have the noise stopped brought only vague and evasive replies, and an increase rather than a cessation of the noise.

When one has seen America first and Europe next, one realizes the rudeness, inefficiency, and impertinence of some servants in American hotels, the extravagant cost of touring America, and how vastly more comfort and enjoyment one obtains for vastly less money by touring Europe. As a feminine member of our family puts it, "When the lady cashier in the swagger hotel is sniffy, when the dining-room superintendent is incompetent and cocky, when the Pullman porter is uncommunicative and surly, when the hotel clerk is supercilious, when the food is bad and the price is high, I find it relieves one's pent emotions to glare at the offender and say, 'See America First!'" I beg to commend

to all who are promoting the "See-America-First" idea that they remember that the vast body of American tourists and would-be American tourists are people of small means, who want the reverse of the absurd treatment they now receive in attempting to see America, and who will be more and more attracted to European travel because of the contrasts above recited.

A KENTUCKIAN.

#### THE POSITION OF THE FREIGHT CHECKER.

OTTAWA, ONT., September 16, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I am pleased to note the letter from "W. L. D." in your issue of August 23 in reply to my few remarks on the subject of freight checkers, printed in your issue of July 19, page 87. That he does not agree with me does not lessen my gratification; he at least took notice.

His little essay on human nature and its tendencies is all right so far as it goes, but it does not seem to go very far; and when he asks, "If checkers were paid as much as mechanics, would mechanics then become checkers?" he shows that he knows very little about mechanics. The fact is that the vast majority of the workers of today find themselves where they are more by accident than design, and once there they stay there. There are the exceptions, but that is the rule. And the mechanic above all others sticks to his place. Moreover there are very few of them who could be made into good checkers anyway. The mechanic has not the right kind of brains; if he ever did have he has lost them through disuse.

To read "W. L. D." as he writes you might get the idea that the people who really make up the world are either in the trades or professions; from the remainder, who are of no account, we must choose our checkers. Now, it has always seemed to me that there is quite a large number of fairly useful souls in the world who have neither a trade nor a profession. In fact, many people might be of the opinion that the world could spare those belonging to either the trades or professions better than those who belong to neither of these classes. I use the terms here in a limited sense as he does, for he evidently considers the work of a freight checker neither a trade nor a profession.

Neither does he claim that matters can be greatly improved without spending more money, but he would not pay the money to better men—he would spend it on "organization and method." Now, I am a great believer in organization and method, and like all other men who do things I think I am a pretty good hand at the game (which does not prove that I am by a long way), but I have yet to see a good organization created, and method carried out, by poor men. When you see a good thing well done look for the good man, or woman, behind it. The good man or woman is always there—that you can stake your life on.

I do object to being put into the "increase-of-pay to improve service" class. I do not think there is anything in my remarks to justify "W. L. D." in placing me there. I wanted to eliminate the old class checker and create a new one, that new one to be a better and higher class and paid more. But there is just a possibility that we are getting our terms mixed. I use the term freight checker to cover the so-called shed foreman as well as the gang checkers. In a small freight house we have one man in charge who does all the bossing and checking. As the size of the house increases we add to this different gangs with a checker attached to each, and the general bossing is done by a foreman with, at times, many sub-foremen under him. Then we have even gone so far as to have an inspector in addition to all of these. So I use the term checker to cover the man responsible for the proper loading, unloading, and checking of the goods, whether he does all the work in a small shed or part of it in a large one. And my idea is to make the position respectable enough to attract good men. For consider the checker's position today, and in the past. If we know anything

about the handling of freight at terminals, and are not blinded by our own conceit, we must acknowledge that these men, call them checkers, foremen, or what you will, are the most important men on that job. But has their importance ever been recognized? W. L. D.'s simile of the college professor and the cook is much to the point, and it fits in here in a manner that he does not seem to have seen. We know that the checker's job is of the first importance, but we do not give him or his job proper recognition. He is given orders by many who should be obeying his orders. He is expected to keep himself and the whole staff, including the shunting and train crews, out of trouble, but he has no real authority to order things done as he wants them. Is it any wonder that better men are not attracted to the job? Under the present conditions no reasonable amount of money will attract to this position men other than those who have been through the mill and have learned to live contented in an atmosphere of injustice, nagging, mistakes and complaints—men who are content to be blamed for other's mistakes that their own may be overlooked, and to be held responsible for errors and delays they have no authority to prevent. Good men, the men we want in this job, will not live under such conditions, they will improve the conditions or get out.

These are a few of the things I mean when I say we want "men of ability, men big enough to stand behind their mistakes and rectify them." Is it not reasonable to suppose that when we secure such men by the offer of a little more money, and a less anomalous position than that occupied by our checkers, the wished for better organization and methods will naturally follow?

OBSERVER.

#### ENGINEMEN SHOULD BE TEETOTALLERS.

EL PASO, TEX., September 10, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring to the letters and your editorial on operating rule "G," in your issue of September 6:

Taking one drink of intoxicating liquor is like running past the red board. It is unsafe. The effect of alcohol is brief unbalanced physical excitation followed by prolonged depression of dulled faculties. Scientific research and experiment have demonstrated that the man who indulges in alcoholic drink is below normal for periods of time varying from a few hours to several days, although there may be no visible evidence of that condition in his appearance or consciousness. It is established that the degree of injury is proportional to the amount of alcohol consumed. It is not enough that the engineer of a railway train be outwardly sober. He should be inwardly normal and perfectly balanced. He is not in that desirable condition when he takes his train out if he has indulged in alcoholic drink during his layover. The possible line between safety and danger in the use of alcohol is dangerously unstable. Safety lies back of total abstinence and the red board only. The ultimate logical development of rule "G" is total abstinence at all times.

The superior operating officers do not always set a desirable example for the train crew. Substantially all first class passenger trains are now practically saloons on wheels, and they are not healthful object lessons to the trainmen.

A normal man has no legitimate use for alcohol as a beverage, and he has no right to render himself abnormal by its use when lives are dependent on his efficiency. None but normal men should run railway trains. The traveling public has unqualified right to demand and expect none less safe.

No one except the thief objects to the prohibitions against stealing, and yet those rules curtail the personal liberty theory which usually is brought forward in the liquor problem.

J. L. CAMPBELL,

Engineer of Maintenance of Way, El Paso & Southwestern System.

CUBAN LINE OPENED.—The first section of the Cifuentes to Esperanza railway, which runs through the San Diego valley, has been opened to traffic.

# CLASSIFICATION FOR RAILWAY FILES.

Outline and Suggestions for Simplifying the Problem of  
Filing Papers and Information for Ready Reference.

By S. E. WALLACE.

The scheme for a classification for railway files, the *outline* of which I now present, is the result of years of experiment and study. It was originally planned to care for the New York law department of a western railway, and later (when it was decided to centralize the system) was expanded to care for the executive, comptroller's and treasurer's departments also. It has not only given satisfactory results in this office, but has been adopted (with certain modifications, of course) in several railway offices in New York and Chicago. This has led me to believe that, as a suggestion at least, it would be useful to others who still have upon their hands the problem of many papers and little time.

Any classification scheme capable of general application must be expansive, so that it can be used in the small office of a local attorney or in the headquarters of the president. Thousands of unused numbers can do no harm—they are as naught before called into use—but the moment a new subject arises its place is evident and ready, and when the small file has grown into a large and important one, each subject will be in its proper group, and each group in its logical relation to its neighbor.

Keeping related subjects in groups is of primary importance. This is the basis of all library classifications, but has been strangely disregarded in the arrangement of files, the majority of which are kept in a meaningless numerical order that merely indicates age—number one is the first file received, number two the second, and so on. Finally related subjects are so widely scattered that the file clerk is entirely dependent upon the card index. The loss of a card very naturally means the loss of a file, and that is a calamity indeed.

The wise file clerk looks upon the "system" only as a means of serving an end, never as an end in itself. The end sought is to produce needed papers in the shortest possible space of time (usually averaging about two minutes), and to have them in such excellent order that they can be quickly and easily used. To accomplish this end three things are necessary.

First—The group classification must be accurate and complete.

Second—The papers and letters in the files should be so well arranged and cross indexed and labeled that any matter, however old, can be found at once.

Third—The card index should be unfailingly accurate and very complete.

## CLASSIFICATION—GENERAL.

Almost every railway system is composed of a parent company and a number of subsidiaries, some of which control smaller companies. The file clerk's first task should be a thorough study of the system, and arrangement, in their proper order, of all the companies under its protection. (Usually an alphabetical arrangement of subsidiary roads is best for file purposes.)

When every company in the entire system has been cared for, the numbers should be carefully assigned. How many should be given to each road depends entirely upon its size and importance, but it should never be less than ten. An experienced clerk always allows for growth by assigning many more numbers than are needed at the time. A small group of "open" or unused numbers should be left after each road and a large group after each letter of the alphabet. Superfluous numbers can never do any harm, but having to crowd new companies into a close file is a problem indeed. Every group of numbers should begin with ten and end with nine. It will be found to be a great aid to the memory and will help the inner arrangement to work as automatically as possible.

The following diagram will illustrate the arrangement I have in mind. We will suppose it to be a *partial* list of the roads of a great trunk line, the East and West Railroad Company:

Name of Road.	Classification Numbers.
East and West R. R. Co.....	1-399
Abbyville Extension R. R. Co.....	Open ..... 400-499
Amityville R. R. Co.....	500-509
(All other A's, alphabetically arranged, each followed by open numbers).....	510-549
Beaver Creek R. R. Co.....	550-569
(All other B's, alphabetically arranged, each followed by open numbers).....	570-599
Central States R. R. Co.....	600-619
Arkansas Midland R. R. Co.....	620-629
Baldwin Construction Co.....	630-699
Western R. R. Co.....	700-729
	730-739
	740-749
	750-759
	Open ..... 760-...

## SUBDIVISION.

After all the companies have been arranged and their numbers assigned, the subdivision of subjects can begin. This should be the same in the case of each road, but the proportion of numbers given each will differ greatly. By using the alphabet in connection with the figures, each number is capable of twenty-six subdivisions; thus a small ten-number road can have in reality two hundred and twenty-six files. This uniform subdivision is of great value as a time saver, for it not only enables the file clerk to find almost any paper without the loss of time necessary to look up cards and note down numbers, but it also means more rapid filing and a system easily grasped by others who may have to use the files. Uniformity can be further obtained, in most cases, by using the key number for a document (*e. o. 6* for a mortgage), *a* for general papers arising in connection with it, (*6a*), *b* for general correspondence, (*6b*) and *d-s* for specific subjects.

The two following tables will show the subdivisions for the main line and for one of its little ten-number companies. It must be borne in mind that a very small road will probably have only one mortgage, publish no reports, and enter into no litigation in its own name:

East and West R. R. Co...1-399	Abbyville Extension R. R. Co...500-509
1.....Articles of Incorporation.....	500
2.....By-Laws.....	501
3.....History.....	502H
4.....Meetings—General.....	502M
4D.....Directors.	
4E.....Executive Committee.	
4F.....Finance Committee.	
4S.....Stockholders.	
5.....Reports.....	502R
5A.....Annual.	
5S.....To Secretary of State.	
6-29.....{ Mortgages, Trust Agreements, etc.....	503-504
	Loans.
	Car Trusts.
30-299.....{ Leases.	
	Deeds.
	Contracts, etc.}.....
300 (Cutter number subdivision)	Litigation and Claims.....507
301-339.....Financial Matters—General (including Stock, Dividends, etc.).....	508
340-399.....Miscellaneous subjects.....	509

The subdivision under "leases, deed and contracts" is necessarily large, and would need even more numbers and a minute division in one office at least—that of the secretary. Contracts alone frequently run into the thousands, in which case a decimal subdivision could be used after first breaking the numbers into groups to care for the different kinds of contracts—trackage, traffic, elevator, express, etc.

"Litigation and claims" I have treated as one entry, because there is no good reason for subdividing them, as far as classification is concerned. Claims so often grow into suits that constant changes would be necessary to transfer them from one division to another. (Large rubber stamps reading CLAIMS and SUITS will be found to be of great help.)

It will be noted that I have assigned but one number to this

subject, but there is method in this apparent madness—a method that will keep the different actions in alphabetical order, and thus allow them to be filled or found without a moment's loss. This one number is to be used in connection with the simple Cutter table, a device by which any name can at once be given the letter and number which will keep it in exact alphabetical order. (This table is used in libraries the country over and can be bought from dealers who sell library and file supplies. The abridged edition is \$1.25, and the full edition about twice that price.) By way of illustration, let us suppose that a freight claim agent has ten cases on hand, and some correspondence of a general nature. The files would stand in the following order:

<i>Litigation and Claims—General</i> .....	300
Brown, Henry, vs. East and West R. R. Co.	
Claim for loss of baggage.....	300-B81
Church, Mary, vs. etc.....	300-C47
Dick, Jones & Marston vs. etc.....	300-D55
Home Packing Co. vs. etc.....	300-H75
Loray, Jones & Co. vs. etc.....	300-L88
Pettibone, Ethel, vs. etc.....	300-P45
Virgil Pencil Co. vs. etc.....	300-V81
Witherspoon & Co. vs. etc.....	300-W77
Woodstock Lumber Co. (East and West R. R. Co.	
vs. Woodstock Lumber Co.).....	300-W86
Wortman, Henry, vs. etc.....	300-W89

If it is desired to arrange the litigation by states or divisions it can easily be done by adding the name to the number. If the above were all Wyoming actions the numbers would then become 300 Wyo. 300 Wyo., 300 Wyo., etc.

B81 C47

We will now assume that all the companies of the system have been properly arranged, numbered and subdivided, and that the numbers 1-2999 have been used in this way. There are, however, hundreds of subjects that cannot be filed under any one road because they relate to the system as a whole. They must have subdivisions of their own. They embrace terminals and coal companies, construction, maintenance of way, equipment, organization, traffic department, accounting, legislation and politics, foreign companies, etc. We will consider them in their proper order:

*Terminal Companies, 3000-3099.*—So often are there papers about terminals in various places—papers that should be kept by themselves under the name of the place, that an alphabetical and Cutter classification should be used here, with certain numbers reserved for "general files."

*Coal Companies, 3100-3399.*—The importance and size of coal files will vary greatly in different departments, and each file clerk must therefore arrange a subdivision that will suit the needs of the office in question. The president, for instance, will probably have a large miscellaneous file, much of which is of present interest only—papers used in the investigation of coal properties, options, offers of sale, etc. Sometimes these coal properties are known by their names, sometimes only as "coal lands in Lucas County, Iowa." A straight alphabetical arrangement like the following will take care of all the smaller companies, which will need to be, in many cases, very thoroughly indexed.

<i>Coal files.</i>	
Birmingham Coal Corporation .....	3100-B53
California—Coal lands .....	3100-Cal.
Dunkirk Coal Company.....	3100-D92
Kansas—Coal lands .....	3100-Kan.
Kansas Coal and Coke Company.....	3100-K13
Pennsylvania—Coal lands .....	3100-P38
Etc.	

The larger companies can be assigned groups of numbers and be subdivided as the railway companies were. There will also need to be a rather large group of numbers for the mining department's reports, and after that, a number, with alphabetical or decimal subdivisions, for coal matters in general, government reports, etc.

#### SUBJECT FILES.

We will now consider what may be termed for convenience sake, the subject file. This will include the hundreds of subjects that relate to the system as a whole, and that cannot be placed under the individual roads. They are so numerous that their care is a problem indeed, and the file clerk will be more

dependent on the cards than in the case of the simpler arrangement under companies, but it is entirely feasible to block out a classification that will keep subjects in their logical order.

Let us suppose that we are planning to care for the papers in the executive office, which keeps in touch with the entire system and receives papers from all departments. The arrangement, the merest skeleton of which I can give here, is capable of expansion in any one part. The maintenance of way department, for instance, would need a much more minute subdivision than would ever be necessary in the general office, but any intelligent file clerk can grasp the principle and expand the classification to meet the needs of the office in question.

In making any subdivision the logical order is always the best, so we will begin with the construction of the road, first assigning to this subject part of the classification the numbers 4000-7999. Throughout this group great care should be taken to leave open numbers after almost every subject, for new entries are frequently needed—sometimes where least expected.

#### Construction, 4000-4499.

General file.  
Land and Right of Way.  
Surveys.  
Grading.  
Drainage.  
Cuts and Embankments.  
Ballast.  
Ties and Timber (Tie plates, etc.).  
Rails.  
Switches, Signals, etc.  
Crossings, Pavements, Tunnels, etc.  
Fences.  
Bridges.  
Offices.  
Stations, Freight Depots, Storehouses, etc.  
Other Structures (Water Tanks, Stock Pens, etc.).  
Shops, Roundhouses, Turntables, etc.  
Tracks (Sidings, Yards, Joint and Terminal Facilities), etc.  
Miscellaneous.

Subdivisions will, of course, be necessary under each of the above headings. In the case of some (shops, for instance), it is frequently helpful to have an alphabetical arrangement for localities in addition to the more general subdivisions.

#### Maintenance of Way, 4500-4999.

General file.  
Additions, Improvements and Betterments—General.  
Material and Stock—General.  
Inventories—General.  
Under each subdivision its own special subjects, e. g.:  
Care of roadbed and right of way.  
Applying ballast.  
Applying ties.  
Applying rails.  
Etc., etc.

*Equipment, 5000-5499.*—Since all car trusts are really mortgages on the equipment, they should be filed under the subdivision "Mortgages" of the roads themselves, but there are so many matters relating to the equipment in general that a special place is needed for them. Their arrangement will necessarily be an arbitrary one. The following list will suggest the main divisions:

Motive Power and Car Committee.  
Interstate Commerce Commission Rulings.  
Depreciation.  
{ Destroyed Equipment.  
{ Replacement.  
Repairs.  
Standardizing.  
Locomotives and Power Conditions.  
Delayed Equipment.  
Rented Equipment.  
Floating Equipment.  
Miscellaneous.

*Organization, 5500-5999.*—Under this heading will come a vast number of subjects, the arrangement of which should be carefully thought out. It should have two main subdivisions, the first of which will care for each department in turn (law, operating, etc.), and the subjects that naturally fall under them. The second subdivision will be for those matters that refer to all departments, e. g.:

Forces (Increases and Decreases)—General.  
Employment (Individual)—Applications for.  
Records of Employees.  
Vacations of Employees.  
Pay Rolls—General.  
Salaries (Individual).

*Traffic Department, 6000-6999.*—Under this general heading

(to which I have assigned a thousand numbers) will come three main subdivisions:

Freight Traffic Department.  
Passenger Traffic Department.  
Immigration Department.

The subdivisions are many, and will vary greatly in different offices. Such subjects as "Passes" and "Private Cars" seem to fall more naturally under the heading "Passenger Traffic Department," than any other, and should be divided in the following manner:

**Passes and Special Rates.**

Rules and Interstate Comm. Orders.  
Printing, etc. (Passes and Pass Books.)  
Annual Passes.  
Trip Passes.  
Commutation and Special Rates.

**Private Cars.**

Movements of, Itineraries, etc.  
Service—Supplies—Bills.  
System Cars—Owners.  
System Cars—Plans and Dimensions.  
Purchases and Sales.

**Accounting, 7000-7499.**—This is a general heading under which can be arranged all the subjects relating to the accounts of the system. In the treasurer's and comptroller's offices they would be legion. The most important headings are:

Accounting—I. C. C. Rulings.  
Balance Sheets.  
Earnings and Expenses.  
Income Account.  
Operating Expenses.  
Treasurer's Reports.  
Cash Statements.  
Securities Deposited in Vaults.  
Dividend and Interest Accounts.  
Bank Accounts.  
General Finances.  
Comparative Statistics.

We have now considered briefly the two main parts of the file. First, subdivision of roads. Second, subdivision of subjects, but there still remain some important matters that need a home of their own. We will consider them briefly in the order in which they should come.

**Legislation and Politics, 8000-8099.**—This section is perhaps the most simple in the entire file, but it is tremendously helpful to the busy file clerk and indispensable in the law department, where subjects like the following are always arising: corporation and other laws of various states. What constitutes "doing business" in another state. Re saving bank investments in certain states. Domiciling in certain states. Political situation in certain states, etc., to say nothing of the numberless bills, etc., always under consideration when Congress is in session. To care for all these matters a simple arrangement like the following is needed:

United States ..... 8000-8046  
Alabama ..... 8047  
Alaska ..... 8048

Arizona ..... 8049  
Arkansas ..... 8050  
California ..... 8051  
Colorado ..... 8052  
Connecticut ..... 8053  
Delaware ..... 8054  
District of Columbia ..... 8055  
(F-Z) ..... 8056-8097  
Laws of All States ..... 8098  
Foreign Countries—General ..... 8099  
Foreign Countries—Individual ..... 8099 England  
8099 France  
8099 Germany  
etc.

It must be borne in mind that each number can be expanded by the use of the twenty-six letters of the alphabet.

Many of the subjects that arise must remain with the file in which they originated, but a cross reference in the "state" file will enable one to find them instantly.

**"Foreign" Companies, 8500.**—Since every office has a mass of correspondence, documents, etc., relating to companies not its own, these too must be cared for, and the simplest and most effective arrangement is the alphabetical one, used with the Cutter numbers.

Immediately following these "foreign" companies should come those troublesome files that are constantly coming in from outsiders who want to build or sell small roads, wyes, connecting tracks, etc. They can have a decimal subdivision or can be arranged according to localities and numbered from 8501 on. They should be very thoroughly indexed, for more than the usual dependence must be placed upon cards for matters that are of a vague or indefinite nature.

**Miscellaneous, 9000-9999.**—There are continually arising subjects that do not fall under any of the general subdivisions, and these are best cared for under the heading "Miscellaneous." They can be filed in number order as they come in, and must be located by the use of the cards. Under this subdivision should be filed such local matters as the purchase of office supplies, subscriptions to magazines, news bureau reports, etc.

**Alphabetical.**—Finally, for inquiries from stockholders and others, name and address cards, and letters vague in nature or temporary in value, a straight alphabetical file is indispensable. By a plentiful use of cross references this file serves as its own index, and cards are therefore unnecessary.

**Maps.**—It is best to put small, flat maps in the file with the other papers. The care of larger maps is a problem. There are cabinets, tubes and drawers of all kinds, but they are usually unwieldy, expensive, and incapable of expansion, and frequently necessitate filing the maps according to size rather than subject. An arrangement that has worked well has been a series of little pens built against a long wall, or around the sides of an alcove, and left open at the top. They can be cheaply constructed of one-inch railings, each about a foot apart, the top rail four feet from the floor. These pens will keep the small rolls from falling out, but will allow very tall ones to be placed beside them. The

FORM NO. <u>674</u>		STATEMENT <u>Balance Sheet</u>		DRAWER NO. <u>12</u>									
ROAD <u>East and West R.R. Co.</u>													
DESCRIPTION <u>Suspense Ledger Balance Sheet. (Monthly.)</u>													
BY WHOM PREPARED <u>Auditor</u>		DATE DUE <u>20th of 2d month.</u>											
TO WHOM FURNISHED		DATE FURNISHED											
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
<u>Comptroller</u>	<u>1912</u>	<u>3/19/12</u>	<u>4/18/12</u>	<u>5/19/12</u>	<u>6/20/12</u>								

Card for Keeping a Record of Statements.

maps are then rolled and tied and placed in the pens. The better grade maps may be enclosed in tin tubes if desired. For a small office ten of these pens should be sufficient. They could be subdivided as follows:

United States and Foreign Countries.....	Section 1
States and Territories—A-M.....	Section 2
States and Territories—N-Z.....	Section 3
City and Town Maps.....	Section 4
Cities and Towns—R. R. Terminals.....	Section 5
East & West R. R. System.....	Section 6
"Foreign" Companies.....	Section 7
Coal Properties—A-M.....	Section 8
Coal Properties—N-Z.....	Section 9
Miscellaneous.....	Section 10

After the maps are rolled a large gummed label, containing the name, description and number should be placed on each, at the upper end. This will enable the file clerk to locate any map at a glance without the loss of time necessary to unroll it. Every map in the place, whether in the vertical files or in the pens, should have a card, not only under its name or location, but under the word "Maps" as well. This will enable the file clerk to assemble all of the maps on a given subject at a moment's notice.

**Statements.**—The many balance sheets, loading reports and other statements that come in such quantities in every railway office, must be provided for according to size and usage. Sometimes book binders best serve the purpose, but for the majority of them a cabinet of drawers, in which the statements can be filed flat, in date order, with the latest always on top, is the most satisfactory.

The cards for these statements should not be filed in the general catalog. They should be large and arranged to show the date of receipt as well as the description of the statement. The sample of a card made in Chicago that has proved most satisfactory for this purpose, is shown at the foot of the previous page.

The classification scheme is now roughly blocked out. When the detail work is finished and the numbers assigned, the entire thing should be copied, each road or subdivision on a separate sheet, and bound in numerical order in a loose leaf binder, which should be kept on the file clerk's desk for constant reference.

Each section, or subdivision, should then be copied on a large guide card and filed in the front of the drawer containing that subdivision. In the first or "Roads" part of the file, guide cards containing a strictly alphabetical list of all the companies with their first, or key number, and placed in the top drawer of each section, will be of the greatest help. These little aids enable the hurried file clerk, trying to serve half a dozen busy men at once, to save many precious moments by being able to locate any subject at a glance.

Vertical files should always be used. Nothing else is capable of expansion. There should be plenty of good heavy guide cards to stiffen and uphold the files and indicate the different subjects. The folders and envelopes should be of rope manila or paperoid. They cost more in the beginning, but far outlast the cheaper materials. If it is necessary to care for the papers of several departments they can be given the same numbers, and yet be kept entirely separate by the simple expedient of a different color for each department. Since the files in this office have been centralized that arrangement has worked with entire satisfaction. For instance, all of the general counsel's letters about a certain mortgage are written on buff paper and filed on a buff letter backer and in a buff folder. The treasurer's color is blue, the comptroller's green, etc. Yet all four files stand together, one behind the other, and have identically the same number.

There are many helpful devices and time savers that could be suggested for use in filing away papers and making the card catalog, but they are details that would take time and space to enumerate and that any ingenious file clerk can devise. If the above hints and outlines are intelligently followed they ought to simplify the problem of those who must file the papers of many departments, and then produce them again in the least possible amount of time.

## A SIMPLIFIED BAGGAGE CHECK.

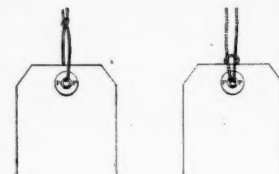
The Pennsylvania Railroad had adopted a new form of cardboard tag baggage check, a sample of which, No. 815,003, is illustrated herewith. The principal improvement over the form

previously in use is in having the number of the tag check at the bottom and that of the duplicate at the top, so that in matching the checks, when baggage is called for, there will be less liability to mistakes in reading. The other new feature consists in the rows of spaces at the bottom of the duplicate, in which the baggageman, when receiving a piece of baggage, can indicate to what extent (if any) it is in bad order. The engraving is reduced about one-third, the size of the card being 2½ in. x 6½ in. The check shown in the sample is printed on white cardboard. Other forms of checks, including those for local baggage, for baggage on which there are excess charges, and special delivery checks are printed on cards of different colors. Of all the forms taken together the Pennsylvania uses each year about 5,000,000 checks. This number would take, roughly, something over a

half million square feet of cardboard, or, say, enough to fill a freight car of 40,000 lbs. capacity.

Some of the new checks do and some do not have the slotted perforations, the shape and size of which are indicated in the drawing. This improvement has been introduced by the Dennison Manufacturing Company, and an officer of that concern informs us that a patent has been applied for. With these perforations the check may be held in any position, and the check may be pulled, torn or twisted off with the certainty that check and stub will part company at just the right points and no other. The new perforation does away also with the time-wasting operation of bending a check back and forth two or three times to be sure that it will tear straight. There is no danger of a crooked tear, and therefore no fear that part of the number on the stub will come off when the check is detached. At the same time there is no danger that the check will part company with the stubs before they are used. The check may be bent back and forth repeatedly without breaking.

The Dennison company calls attention to the desirability of tying the strings by which cardboard checks are secured. It has been found that checks "threaded" and "knotted" (i. e., with the twine passed through the eyelets) as shown in the left hand figure in the small cut will withstand almost twice the pull of checks having the twine "looped and knotted," as in the right hand figure. The reason for this is that when a strain is brought to bear on the last mentioned check the twine cuts the cardboard and the patch, and the latter pulls out. On the "threaded" check, however, the strain is on the inside of the patch only and is just where the patch is strongest. The experiment may be easily tried with checks and strings of the same quality by pulling one against the other. The "threaded" check is invariably the winner.



## RAILWAY SIGNAL ASSOCIATION.

The opening session of the annual meeting of the Railway Signal Association at Quebec, October 8, 9 and 10, and the names of the new officers were reported in the *Railway Age Gazette* last week, page 692.

The new president of the association, B. H. Mann, of St. Louis, Mo., began railroad work as a telegraph and station operator on the Old Colony Railroad of Massachusetts, now a part of the New York, New Haven & Hartford. Three years in station work were followed by four years in the train service. He completed an electrical engineering course at the Massachusetts Institute of Technology, graduating in the class of 1890. The following year he spent in the shops of the Union Switch & Signal Company, at Swissvale, Pa., and in 1891 was sent to the Cincinnati, New Orleans & Texas Pacific in connection with the installation of automatic block signals. He remained there and was superintendent of signals on that road for seven years. Following this he was connected with the installation of the interlocking on the Boston Terminal (South station) under J. P. Coleman, who had charge of that work. Mr. Mann was in charge of this interlocking during the first year it was in service, with the title of superintendent of interlocking. From the Boston Terminal he went to the Chicago & Alton as signal engineer, in 1900. In 1903 he went to the Missouri Pacific as signal engineer, which position he still holds. Mr. Mann has served as chairman of the R. S. A. Committee No. 3 on Power Interlocking for several years.

The secretary's annual report showed a total membership of 1,205, which is 32 less than the number one year ago. Additions of 120 were more than offset by resignations (20), deaths (6) and lapses. The secretary explained that a considerable portion of the resignations and lapses were due, no doubt, to the retirement of men from the signal business; and it may be that not sufficient effort has been made to bring into the association the new men in the signaling field who have taken the places of those who have left it.

The treasurer's report showed total receipts \$11,508, the principal items being: balance at the beginning of the year \$2,830; dues, \$4,161; sales of printed matter, \$1,998; and advertising \$2,321. The principal items under the head of expenditures were: printing, \$2,722; the manual, \$1,459; salaries, \$2,242; cash on hand at end of year, \$2,402. The aggregate of cash on hand, \$2,402, with other assets, exceeds the liabilities by \$4,163.

The main work of the Quebec meeting consisted almost wholly of approving (or disapproving) a large number of changes in the standards of the association, as proposed by the several committees. These changes, when approved by an annual meeting must be submitted to and approved, through the medium of a letter ballot, by two-thirds of the active members of the association. But while the questions before the meeting for de-

cision were thus mostly to be answered by "yes" or "no," members freely exercised their privilege of asking for additional information before deciding how to vote, and these questions and their answers took up the greater part of all the sessions. This devotion of time to many small details was the subject of some animadversion, as being essentially committee work; but, on the whole, in the absence of other propositions requiring discussion, the queries and counter-queries may be said to have served the useful purpose of producing just the right amount of stimulus for a profitable meeting. We note below the action on each committee report, the page references being to the pamphlet in which the committee reports were printed.

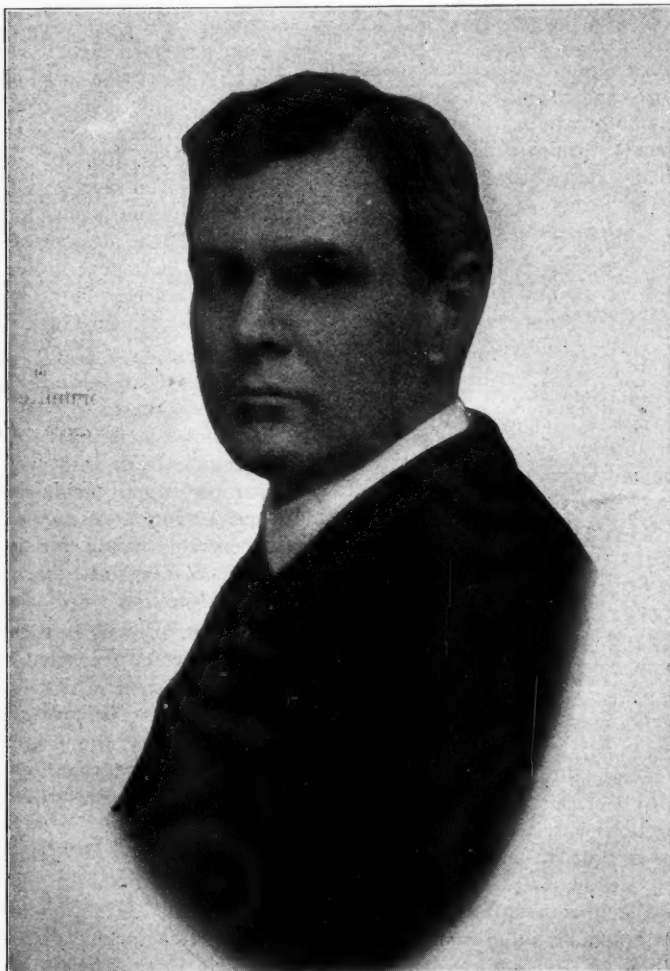
**Power Interlocking.**—The first subject discussed by the meeting was power interlocking, reported on by Committee No. 3. B. H. Mann, chairman. The classification of voltage ranges proposed by the committee in its report, page 62, was adopted, to be referred to letter ballot. These (as well as many other subjects reported on by committees) had been discussed at the June meeting. In the last paragraph of the report 600 should read 660.

The report of sub-committee A, W. H. Arkenburgh, chairman, page 27, offering specifications for mechanical and electrical time releases, was criticized as not containing sufficient details, but after some discussion, and after slight corrections, was ordered to letter ballot. The diagram of typical indication locking, on page 28, was likewise ordered to letter ballot.

The report of sub-committee B, F. B. Wiegand chairman, submitting circuits for electric interlocking, in which the designs of three of the principal signal companies were adopted, was discussed at considerable length. The Board of Direction has decided that the association ought not to adopt as standard anything which is applicable only to the product of one manufacturer. It is to be acknowledged that this has been done in the past, and therefore the association is in a somewhat delicate position, as there is a possible appearance of unfairness. The association, therefore, voted that the circuits presented by the committee should be accepted as information only; thus they will go into the proceedings but not in the manual.

The report of sub-committee C, I. S. Raymer, chairman, page 54, consisting of specifications for vitrified clay conduits, was briefly discussed and, with slight changes, was ordered to letter ballot. The specifications for fiber conduit took the same course, the committee accepting a suggestion that no pieces less than 3 ft. long should be accepted, and one to add a clause relative to marking goods for shipment.

The report of sub-committee E, R. C. Johnson, chairman, on electro-pneumatic interlocking for drawbridges, after brief discussion was ordered to letter ballot. In the discussion on flexible air hose connections to drawbridges, the fact was brought out that an automatic hose coupler was under investigation on the Atchison, Topeka & Santa Fe. The provision for additional



B. H. Mann.

drawings proposed on page 61, as well as the clause making stronger the insulation tests (paragraph 20) was ordered to letter ballot.

*Electric Railway and A. C. Signaling.*—The report of committee No. 8, H. S. Balliet, chairman, filling 130 pages, was discussed at length on Tuesday and, following numerous criticisms, the report on the use of alternating current for steam railway use was ordered recommitted; but on Thursday after reviewing the report of the discussion, it was seen that all of the criticisms which had made such an impression on the meeting had to do with clauses (on pages 235 to 268) which had been copied from specifications (for other classes of work) which now appear in the manual as standard; and thereupon the vote of Tuesday was reconsidered and that part of the committee's report on the pages named (235-268) was accepted and ordered to letter ballot. The effect of this is to put the stamp of approval on the work which the committee had done, i. e., the preparation of specifications for alternating current apparatus and arrangements.

All that portion of the committee's report describing alternating current signaling in Europe and America, shown on pages 157 to 233, was accepted as information. This part of the report, made up from statements furnished by numerous signal engineers and other railroad officers, contains a great mass of recent history. Among the plants described are the following: block signaling on the Harlem River branch of the New York, New Haven & Hartford; New York division of the Pennsylvania; Norfolk & Western, in Ohio; Cumberland Valley; Denver, Laramie & Northwestern; Rochester, Syracuse & Eastern; Illinois Traction; San Francisco, Oakland & San Jose; New York, Westchester & Boston; Pennsylvania, New York City terminal; New York, New Haven & Hartford in southeastern Massachusetts; Boston & Albany at Riverside, Mass.; Boston & Maine, Hoosac tunnel; Interborough, New York City (solenoid signal); London Underground railways; Brooklyn Bridge, New York; Boston Elevated (Cambridge subway); and finally a list, furnished by Arthur H. Johnson, of all automatic block signal and power interlocking signal installations in Great Britain and the British colonies.

The specifications beginning on page 269, for railways using direct current for propulsion, were ordered to letter ballot; but paragraph 431, lamp boxes, was ordered to be referred to the committee on standards.

*Automatic Block Signal Apparatus and Fixtures.*—The report of committee No. 4 (page 63), A. G. Shaver, chairman, brought out a long discussion on relays. Brass armature bearings were opposed by advocates of German silver, but brass was strongly defended. In connection with paragraph 10, of the specification (page 69), there was a debate on silver versus platinum; but it was finally voted, unanimously, that both silver and platinum should be named in the paragraph. In discussing tests of magnetic iron, paragraph 14, the committee reported that it had found it impossible to devise a rule suitable for all the different kinds of relays. Paragraph 15a (drop-away tests) was defended by the committee as the best result of experiments. Paragraph 16a (adjustment of relays) had been prepared with careful consideration of the relays of all makers. The relay specifications were finally ordered to letter ballot.

The battery specifications, page 73, were briefly discussed. The drawing, page 75, was ordered to letter ballot, but the specifications were recommitted. The drawing on page 79, switch instrument rod, point lug and link was briefly discussed and the committee directed to refer it to the committee on standards. The specifications for channel pins were ordered to letter ballot. Mr. Shaver showed samples of copper clad and tinned pins made under the proposed new specifications. The specifications of sizes of wire to be used for different purposes, page 84, were discussed at length, and adopted with an amendment to allow the sizes named as minima with blanks to be left for the use of other figures if desired. Cross-arms (page 85) were discussed, some members

desiring to add an arm 8 ft. long with 8 pins. The committee said it had followed Western Union standards. Arms made to these standards, but not drilled, are kept in stock by dealers. The specifications were finally adopted, against the protest of the minority at the omission of an 8 ft. arm with 8 pins.

The standard cross-arm pin as revised October, 1912, was ordered to letter ballot, also the gage, page 93, and the braces, page 95. The bolts shown with the brace were criticized, but the committee promised a better bolt next year. The bolts on pages 98 and 99 went to letter ballot. The specifications for a glass insulator, page 102, were recommitted after a short discussion. The specifications for galvanizing, page 104, were ordered to letter ballot. These have been adopted by the American Railway and the American Railway Engineering Associations. The specifications for white cedar poles went to letter ballot.

*Mechanical Interlocking.*—Committee No. 2 C. J. Kelloway, chairman, presented eight typical plans for tower leadouts; and after a brief discussion in which it was explained that these were typical but not exclusive standards, they were ordered sent to letter ballot. The paragraphs proposed as substitutes for existing sections, Nos. 100, 101 and 102, of the specifications, were recommitted. The specifications for an electric bolt lock for mechanical interlocking plants having power signals were criticized at some length, the ideas presented by the committee constituting really a new departure, not simply a harmonizing of existing devices or practices. There was a demand for more explanation in the shape of drawings. This part of the report was recommitted.

*Manual Block Signaling.*—The report of committee No. 5, T. S. Stevens, chairman, was discussed at length. The use, in the committee's diagrams (pages 118-128), of train-order signals on double track with arms for both directions on the same post was persistently criticized. The committee explained that much more work was to be done, the present report having been presented mainly for information. After hearing arguments for and against the inclusion of the drawings in the manual, the meeting voted to receive them as information.

*Storage Battery.*—The committee on this subject, R. B. Elsworth, chairman, reported that its recommendations represented conclusions which had been reached after reconciling the divergent views of manufacturers and others. The specifications represented the present best practice. After rejecting the last part of paragraph 9, and cutting out the word "design," the specifications were ordered to letter ballot, including the drawings.

*Signaling Practice.*—This committee, A. H. Rudd, chairman, which has carried on continuous discussions for several years past, and which has always hitherto been blessed with a strong minority, presenting a dissenting report, this year reported unanimously three schemes of signal aspects. These represent the compromises which were substantially agreed upon a year ago, and which conform to the views of the American Railway Association's committee on transportation. This report, without a word of discussion, was unanimously adopted and ordered to letter ballot; and on motion of Mr. Stevens, a message of congratulation was telegraphed to Chairman Rudd at Philadelphia, who was unavoidably detained from the meeting.

This committee presented as information certain data which it had gathered on the subject of flash lights for railway signals.\* This part of the report says in part:

"For the production of the flash-light effect acetylene gas is used. The gas is filtered and admitted to a chamber where sufficient pressure has to develop to overcome the pull of a permanent magnet on its armature. When the pressure reaches a certain given strength the armature is forced away from the permanent magnet and a valve is opened to the burner. The gas is ignited by a small pilot light which burns continuously. The

\* Lights of this kind, in use at Liljeholm, Sweden, were described in the *Railway Age Gazette* March 1 last, page 389.

dark period can be varied by a valve adjustment tending to increase or decrease the length of time for the gas in the chamber to reach the needed pressure. The permanent magnet is introduced to provide snap action both with regard to the opening and closing of the valve which operates the flash light.

"It seems reasonable to suppose that where a number of signals are grouped on one structure as they are at the entrance to many of our stations, alternating fixed lights and flash lights would assist the engineman very materially. This only appears to be a question of degree, however, since the signals would have to be identified in groups of two instead of individually in order to allow the engineman to be definitely assured that the signal he accepted was his signal.

"After all is said, however, it would appear that location of signals with reference to the tracks they govern, and their control, are greater factors in the safe signaling of complicated situations than is the identification of the signals themselves by some mechanical arrangement or by color. If signals are located so that a fair amount of tangent is provided before reaching them, it would seem that no hardship is occasioned by requiring that the engineman should pick out the signal directly in front of his train. If no tangent approach is possible, a properly controlled caution signal before trains reach the stop signal should take care of the situation."

The Commercial Acetylene Company, of New York, which is putting flash lights on the market in this country, exhibited two signal lamps with the flashing apparatus in operation.

**Standard Designs.**—Committee No 6, J. C. Mock, chairman, presented 35 drawings of proposed standards. Some of these were briefly discussed, and the action taken was as follows: drawings 1,032, bracket post; 1,040, semaphore spectacle, design A; 1,041, design B; 1,056, terminal block; 1,057, crank stand; 1,060, rocking shaft arms; 1,061 rocking shaft bearings; 1,062, rocking shaft assembly, all sent to letter ballot. No. 1,063, details of low locking shaft bearings, was recommitted, several members favoring the use of two bolts instead of four.

Drawing No. 1,064, a diagram of curves showing torque required to move electric semaphore spectacles, which was characterized by Mr. Stevens as one of the most valuable assets of the association, was ordered to letter ballot; as were 1,068, vertical deflecting stand, and 1,069, deflecting bar. The dwarf signal No. 1,097 was ordered to letter ballot, although the committee reported that it had not yet made exact drawings of all the details.

The next fifteen drawings were adopted and sent to letter ballot as follows: 1,098, detector bars; 1,178, clamp for base of masts; 1,179, handrail for bracket post; 1,180, base for cable posts; 1,181, cap for same; 1,182 and 1,185, relay box; 1,190 and 1,191, connections for bracket post; 1,194, mechanical semaphore bearing; 1,195, 1,196, 1,197, 1,198 and 1,199, pipe and crank fittings and details. Drawing No. 1,225, stuffing box for 1-in. pipe, elicited some discussion on account of differences of opinion as to whether the plunger should be tubular or solid, and the design was recommitted; and the same course was taken with 1,226. The battery elevator, No. 1,227, was sent to letter ballot. The battery chute, 1,228, 1,229 and 1,230, was acted on favorably after the committee had been instructed to provide for chutes 6 ft. and 8 ft. long, as well as 7 ft. and 9 ft. The upper quadrant dwarf spectacle No. 1,233 was then quickly adopted, and the committee was thanked for presenting this unusually large number of designs.

**Definitions.**—Committee No. 7, E. G. Stradling, chairman, presented about twenty pages of definitions of terms used in signaling. These were briefly discussed and the report was then left in the hands of the committee, Mr. Cloud explaining that, as careful examination by the members was what was desired, and as this could not be done in the meeting, no doubt the work could be improved during the coming year. Mr. Stevens commended the work as having few faults, and a resolution was adopted thanking the committee.

**Wires and Cables.**—Committee No. 9, W. H. Elliott, chair-

man, reporting on this subject, recommended numerous changes in specifications. The report contained substantially what was presented to the association at the meeting in New York last June. There was considerable discussion over paragraph 4c of the specifications for copper clad line wire. It was voted the sense of the meeting that where necessary three samples might be taken from a coil, but the average should not govern the question of acceptance or rejection. The question was asked why the mechanical and electrical properties of wire were specified differently in the clause referring to bonding wires from what they were in the clause referring to line wire; it was replied that as bond wires need not be made to conform to so strict a standard of conductivity, not so much care was necessary. After some slight corrections in detail the specifications for line wire were ordered to letter ballot. In discussing bond wires, Mr. Shaver called attention to the desirability of having every tag show the name of the manufacturer. After cutting out the word "average" as in the case of line wires, the specifications for bond wires were ordered to letter ballot. Discussing rubber compound there were objections to the table prescribing ingredients, paragraph 4, on the ground that these represented the product or practice of some particular manufacturer. It was replied that the list represented the consensus of prominent makers' practice at present; that the association could and should have confidence in the conclusions of its committee, and that some standard like this was necessary in order to enable signal engineers to secure intelligible records and data for comparison. Mr. Elliott has used the proposed specifications since last June. After some little further discussion and the declaration by prominent members that, of course, they would feel free to use a better specification if one should be brought out, the specifications were ordered to letter ballot. Letter ballots were then ordered on taping for braided cables, page 291; other changes on page 291; specifications for armored cables, page 292; and the other specifications to and including page 300; but not until after a long discussion on the last paragraph in the report, that in which the committee proposed that the stripping machine process should be preferred in ordering insulated wire. This was softened by cutting out the last sentence of the committee's recommendation.

**Contracts.**—The committee on forms of contracts for the use of railway companies in maintaining and operating interlocking plants at crossings has done little work during the past year because of the resignation of its chairman, Mr. Clausen, who has gone out of the railroad business. Secretary Rosenberg had, however, compiled the work done by the committee and presented three forms of contract. These having been thus printed, in full, and being now available for the use of such members as may wish to inquire into this subject, the report was recommitted.

**Records of Signal Performance.**—The committee on this subject, H. W. Lewis, chairman, reported forms for enginemen's report; despatchers' record of delays; signal maintainers' report; record of individual signals; and a monthly summary. These were recommended as guides for the use of railways desiring to revise their forms, but not as inflexible standards. The committee had concluded not only that it would be impossible to agree upon a form which would become universal, but that it was not particularly desirable to attempt such a thing at the present time. On this explanation the report was adopted and the forms ordered to be submitted to letter ballot.

**COAL UNDER A PRUSSIAN RAILWAY.**—Preparations are being made to move a section of an important Prussian railway, including a station, to enable a company to mine the coal (lignite) underneath it. The station will be moved nearly a mile; and the land proprietors of the old station (2,000 inhabitants) demand an electric road to connect them with the new one; but as the town itself is underlaid with thick seams of coal, it will probably disappear from the face of the earth.

# HEADLIGHT TESTS BY THE WISCONSIN COMMISSION.

Made with the Cooperation of the Chicago, Milwaukee & St. Paul and the Chicago & North Western Railroads.

A report of these tests was presented before the Western Railway Club, October 15, 1912, by C. M. Larson, assistant chief engineer of the commission. An abstract follows:

Preliminary observations were made of an ordinary standard headlight which had been in service for several months, a new lamp of the same type, and a Bunn down draft oil light with 16 in. lens. These observations were made under unfavorable conditions as regards surroundings, being made on ground where no rails were laid and where the surface was dark and irregular. The following is a summary of the observations:

"A man in dark clothes walking away from the Bunn light disappeared at about 350 ft. A man in medium, mixed suit disappeared at about 300 ft. when viewed by the Bunn light, at about 280 ft. when viewed by the new standard light, and at about 180 ft. when viewed by the old standard light. A man in white shirt and black trousers disappeared at about 600 ft. when viewed by the Bunn light as compared with 400 ft. to 450 ft. with the lamps of the other type."

A series of road tests were made later in co-operation with representatives of the C., M. & St. P. over a piece of straight track about six miles west of Madison, Wis. A stretch of track 1,600 ft. in length was measured off, and a marked stake was driven at the side of the track at each station. Men were located at regular intervals along this stretch for the purpose of observing and recording the position of the "object" or of the engine during the tests, which were conducted in the following manner:

**Standing Tests.**—The locomotive carrying the test headlight was placed with its headlight opposite station zero of the course and men dressed in various colored clothing approached along the track from a point beyond the range of vision. The observers were stationed in the cab, on the tender, or on the ground near the engine, and record was made when first the "object" was seen by any of the observers and at regular intervals thereafter, the distance of the object from the light being determined by men stationed along the right of way. In no case did the observers know what to expect before the object was seen.

**Running Tests.**—An object consisting of either one of more men, or a dummy, was placed on the track at a point unknown to the observers, who were stationed in the cab, on the tender, or on the front end of the engine. The engine was first backed well away from the measured course and then run forward at 6 to 10 m. p. h. The first observer to distinguish the object gave the signal to "blow" and the whistle was sounded at regular intervals of a few seconds until the object was reached. Each observer then recorded what he saw at each sounding of the whistle. The men along the track, who were concealed from view, recorded the position of the front end of the engine at each blast.

Two tests were also made with a new standard 16 in. round case headlight using safety B. oil. A man in a medium light suit walking away from this light disappeared to most of the observers at about 400 ft., while a man in dark blue was lost at about 300 ft.

## FURTHER TESTS.

It was further decided to broaden the scope of the investigation to cover several types of headlights which might be proposed for use in the state. In order that the investigation might be as complete as possible, the tests were made with two objects in view, namely: To determine the distance that an "object the size of a man" could be seen on a dark, clear night, and to observe what effect, if any, the various headlights might have on signal and classification lights.

The Chicago & North Western offered the use of its tracks on the Madison division south of Madison, where a straight

piece of track was available, and where use might be made of the interlocking tower at South Madison for the signal tests. The tests were made on the following headlights: American electric; Pyle National electric; Commercial acetylene, 18 in. and 27 in., and the 18 in. Bunn safety oil headlight.

It was decided to repeat the tests on the Bunn safety light on the tracks of the Chicago & North Western in order that results might be compared with those obtained with other lights.

**Obstacle Tests.**—A straight stretch of track was measured off and stakes set as described in the previous road test. In general three sets of observations were made with each light, both in the "standing" and in the "running" tests, namely: with men wearing different colored suits of clothes, as objects. In no case did the observers know what kind of an object to expect, and in the "running" tests the objects were placed at various points along the course, unknown to the observers.

**Signal Tests.**—A signal bridge extends across the three tracks of the Chicago & North Western just south of the Chicago, Milwaukee & St. Paul crossing over the two west tracks; the bridge carries lights and boards controlling northbound trains. The lights to be tested were on engines headed north on the third or east track. A course 2,500 ft. long was measured off south of the signal bridge. The tests of the effect of the electric lights on signals were made by stopping every 500 ft., when each observer recorded just what was visible on the bridge over the two west tracks. Various combinations of the lights were made on the signal bridge, which were unknown to any of the observers. The first point of observation, 2,500 ft. from the bridge, was well around a curve, and, therefore, the headlights were not directed towards the signals from this point.

During the test of the American electric, the blades as well as the lights were observed, but for the remainder of the tests only lights were observed.

**Laboratory Tests.**—Measurements of the illumination of the Bunn 18 in., Bunn 16 in., some standard oil headlights, and on Commercial acetylene lights were made by members of the staff. All these tests were made on the University grounds with a Sharp-Millar universal photometer.

The following table gives the results of all of these tests:

ILLUMINATION FROM VARIOUS HEADLIGHTS MEASURED IN FOOT-CANDLES.  
Foot-Candles measured at a distance given.

Type of light.	100 ft.	200 ft.	300 ft.	400 ft.	500 ft.
Standard light, old.....	0.14	0.01	0.02	....	....
Standard light, new.....	0.15	0.03	0.02	0.01	....
Bunn light, 16 in.....	0.44	0.04	0.05	0.025	0.01
Bunn light, 18 in.....	0.40	0.10	0.05	0.03	0.02
Acetylene light, 18 in..	1.45	0.54	0.22	0.11	0.10
Acetylene light, 27 in..	0.74	0.30	0.18	0.13	0.08

It should be explained that the 27 in. reflector of the acetylene light was in very poor condition. From a position in front, the upper third appeared entirely dark. This was true to some extent during the road tests also.

## RESULTS.

**Obstacle Tests.**—It was plain to all who observed the obstacle tests that the first observations were invariably made as soon as the object first became visible to the slightest extent, and in general it was some time thereafter before the object was "plainly" discernible.

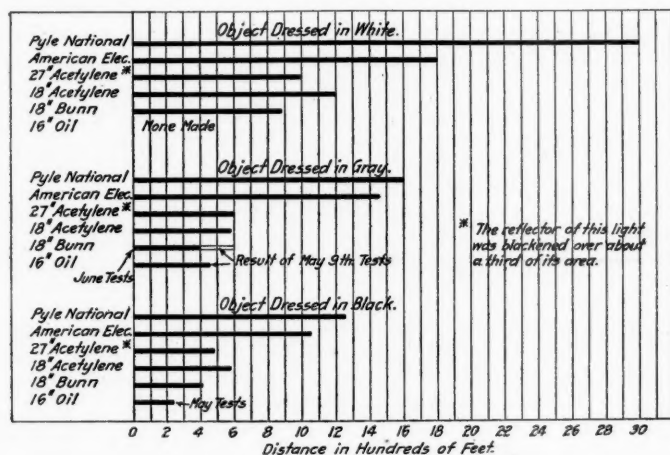
Another point to which attention is called is that all observers were almost certain that some kind of an object would be seen somewhere along the measured course and within a short time after the test was started, and no doubt this fact also tended to assist the observers in discerning the object earlier than would have been done had the objects been seen during the regular operation of a train.

However, all conditions were made as nearly similar to regular operating conditions as it was possible to get them in a test.

In order that the observers might not report before the objects were actually seen, they were warned that it was the intention of those in charge to run several tests without any object at all, and in fact this was done in two or three instances.

It was found that persons located on the pilot or near the front of the engine were able to detect the object considerably earlier than persons in the cab. In one series of "running" tests, however, the man driving the engine was the first to detect the object in every run.

The accompanying chart shows in a general way comparative results of the obstacle tests. Each line representing the distance the objects were visible is necessarily an average of several tests, and each test was observed by many observers. The chart,



Results of Obstacle Tests of Headlights.

therefore, simply represents the writer's judgment in the matter. Moreover it was not necessarily the greatest distance that was taken, but that distance at which a majority of the observers appeared to see the object with some degree of distinctness.

**Signal Tests.**—Three tests were made with the Pyle-National electric headlight opposed by an American electric headlight, located on an engine 150 ft. south of the signal bridge, as follows: Lamps removed, blades horizontal and a white light placed over the east signal; lamps in place on both sides but not lighted, blades in a horizontal position; and a red light burning on the west side and a green light burning on the east. During these tests practically all of the observers read the lights correctly at all stations.

In the test with the Pyle-National and no opposing headlight two lamps were in place, but not lighted, and the arms were horizontal. Exclusive of the 2,500-ft. station, which was around the curve, out of 86 observations by 11 observers, 90 per cent. show a white, green or blue light.

During the test of the Pyle-National with no opposing light, all 11 observers saw either a red or green light on both sides at 1,500 ft., when the signal lights were extinguished, and all recorded nothing seen when the test headlight was suddenly blanketed. This was repeated with the same results.

In the test of the American electric headlight with no opposing headlight and the west signal with the light behind a red lens, blade horizontal, and east signal with the lamp taken out and the blade horizontal, all observers correctly read the west light, and out of a total of 100 observations of the east light at all five stations by 20 observers 95 show either a white or green light. Four of the remainder show nothing seen at 500 ft. from the bridge, and one nothing seen at 2,500 ft. In another test with this headlight and no opposing light the west signal had a green light and was correctly observed by all the observers. On the east signal the blade was horizontal, but the lamp had been removed, and out of a total of 80 observations at 2,000, 1,500, 1,000 and 500 ft. by 20 observers, 78 show a white, green or yellow light, while the other two show nothing seen at 500 ft.

In the test of the American electric headlight, opposed by a

Pyle-National, the west side signal with a red light burning was read correctly by all observers at all stations. Out of 80 observations of the east side signal with the blade horizontal and light removed, at 2,000, 1,500, 1,000 and 500 ft. by 20 observers, 69 show white, green or blue light, and one a red light. All saw either a white, green or blue light at 1,500 ft. and at 1,000 ft. In another test a green light burning on the west side was read correctly by all observers. On the east side with blade horizontal and light removed, out of 80 observations at 2,000, 1,500, 1,000 and 500 ft. by 20 observers, 68 show white or green lights, and all 20 observers saw white or green at 1,500 ft. and at 1,000 ft.

In the test with the Pyle-National and no opposing light, on three red lights burning and one red lens with no light, practically all of the 21 observers read them correctly, but all saw a red light from the red lens in which there was no light burning, at 500 ft. This was also seen at 1,000 ft. by eight observers. On another test of the Pyle-National with no opposing light, on one red light burning, two green lights burning and one green lens with no light, the readings were made correctly with but few exceptions. In still another test of the Pyle-National with no opposing headlight on two red lenses with no light, one red light and one green lens with no light, one of the west red lenses was observed to be either white or green by 56 observations out of 98. The other lights were read correctly by nearly all except that about all observers read the other red lens with no light, at 500 ft. Out of 60 observations of the Pyle-National headlight with no opposing light on two red lenses with no light, two green lenses with no light and one green light, 80 per cent. indicate a white or green light at 2,000, 1,500 and 1,000 ft. on one of the red lenses. Only 13 per cent. of the 60 observations saw any light at 2,000, 1,500 and 1,000 ft. from one of the green lenses, and only one saw a light at 2,500 ft., and none at 500 ft. One of the green lenses and one of the red lenses were on switches and the green was not seen at all, while 10 out of the 20 observers detected the red at 1,000 ft. and all saw it at 500 ft.

In a test with the Pyle-National, with no opposing light, on two red lenses with no light, one green lens with no light and one red light burning, it was shown that on one of the red lenses, out of a total of 60 observations at 2,000 ft., 1,500 and 1,000 ft., by 20 observers, 56 show either a white, green or orange light and three show a red light. When the headlight was blanketed at 1,000 ft. only one reports having seen a dim light. With the red light burning, out of a total of 56 observations at 2,000, 1,500 and 1,000 ft. by 20 observers, 87 per cent. show either a white, yellow, green or orange light, while 7 observations show a red light. When the headlight was blanketed at 1,000 ft. practically all record having seen the red light.

**Switch Lights.**—One feature in connection with the observations taken on the switch lights is that when they were lighted they were almost always read correctly, and when the lights were extinguished the observers saw the red usually at 1,000 ft. and almost always at 500 ft., while the green was seldom seen. In no case was an error made in reading the correct color of the switch lights.

**Semaphore Blades.**—During the test on the American electric observations were made on blades as well as on lights, and with no opposing headlight none were seen at 2,500 ft., 30 per cent. saw them at 2,000 ft., and practically all saw them at the remaining stations. In another test with no opposing headlight, nobody saw the blades at 2,500 ft., 25 per cent. saw them at 2,000 ft., and nearly all saw them at the remaining stations. In a test with a Pyle-National opposing, nobody saw any blades at 2,500 or 2,000 ft.; 50 per cent. saw them at 1,500 ft. and at 1,000 ft., and all saw them at 500 ft. In another test with the same opposing headlight, nobody saw the blades at 2,500, or at 2,000 ft., and only 5 per cent. saw them at 1,500 ft.; at 1,000 ft. 30 per cent. saw the blades, while at 500 ft. 80 per cent. saw them.

**Classification Lights.**—Attention is called to the fact that out of 182 observations made by 13 observers standing on the track

600 ft. in front of the Pyle headlight, while various colors of white, red or green lights were exposed where classification lights are carried, not one light was seen in the entire 182 observations.

The same test repeated with the observers about 100 ft. in front of the engine resulted in 149 out of the 182, or about 82 per cent. being read correctly.

[Mention was made by the author of the experiments conducted by Prof. C. H. Benjamin of Purdue University which were reported in the *Railway Age Gazette* of April 22, 1910, page 1038.—Ed.]

A series of tests made early in 1909 by J. W. Chamberlain, ophthalmic surgeon of the Great Northern, attacks the problem from a somewhat different angle and is quoted here, the report being in shape of a letter to Assistant General Manager H. A. Kennedy, dated February 23, 1909:

"I took three men whom I had previously examined and found their vision to be perfect in every particular. They were placed in a darkened room, with an electric headlight at about the same distance in front of them that a headlight is in front of the cab on an engine. The men were directed to look steadily ahead into the area illuminated by the electric light and at intervals of three-quarters of an hour, a headlight was operated from the opposite direction, to represent another train, as it would appear, if passing on a parallel track.

"After a while, colored lights, representing those in use for railway signals, were exposed as they would be seen from a locomotive coming into a station or yards. These lights were exposed one at a time. It was demonstrated that after a lapse of two hours, the colors that were exposed within the field illuminated by the headlight were so diffused as to make it utterly impossible for any of us to tell what the colors were. For instance, an intense red would have the appearance of a light yellow, yellow would have the appearance of grayish white, while, green and blue could not be distinguished from each other, but had the appearance of being gray or grayish white."

#### ELECTRIC HEADLIGHTS IN OPERATION.

At a conference of locomotive engineers called by the Wisconsin Railroad Commission on September 12, 1912, a very thorough discussion took place between those favoring the electric headlight and those opposing it. In general those who have driven an engine carrying the electric headlight admit that it is difficult to distinguish classification lights and to determine the number of the engine in meeting trains. In recognition of this, one large system has devised a method of displaying the engine number at a point nearer the cab, and it is probable that colors could be handled in the same way. It is claimed that this is satisfactory.

The engineers claim to be able to distinguish the blades of semaphores and to be governed accordingly, and though they admit seeing flashes of lights at times, they are able to recognize them and do not become confused.

They also learn how to protect themselves from the rays of an approaching headlight. They admit difficulty with flagmen and yardmen between two engines approaching each other, both carrying electric headlights. They believe that this can be handled in a satisfactory manner by turning off the arc and throwing in the incandescent light. This is also done when a train carrying colors meets another, and at other times when, in the opinion of the engineer, his light is likely to inconvenience the driver of the approaching engine.

Interviews of others in railroad business resulted in a great divergence of opinion ranging from the belief that electric headlights are the very best that can be devised to the belief that electric headlights represent the very poorest in railroad practice.

#### CONCLUSION.

Special attention is directed to the fact that in all the tests conducted in Wisconsin a majority of the observers were men in regular service of the railroads and for the most part they

were locomotive engineers. It would appear from the data collected during the signal tests that the use of high power electric headlights is attended with grave dangers, especially when there are two or more running tracks or where many signal lights are necessary, as in block signals and interlocking plants. These dangers exist largely because of the liability of a light to become extinguished, and because of the danger of an engineer being unable to see colors displayed on another engine.

The device of turning off the electric and turning on the incandescent at critical points cannot be relied upon entirely because of the inability of one engineer to know when his light may interfere with the operator of another train, and also he himself may be busy at the critical time and be ignorant of the situation. On the other hand, no doubt, many accidents have been averted by use of the high power lights, and it is well known that they are being operated every day on many good railroads.

#### DISCUSSION.

C. S. Wilbur of the Brotherhood of Locomotive Engineers said that engineers want a good efficient light. The disadvantage of the phantom lights is overcome by the added light from the high power light; the semaphore can always be seen and the strong light can be turned off when necessary, and the smaller power one can be used.

M. Nevius of the Chicago & North Western said that with high power lights trains could not be located in stations, as it was hard to judge the distance to an electric headlight. Engineers will not always turn off the opposing light.

Professor Harding of Purdue University said that an obstacle cannot be seen soon enough to stop, even with electric headlights. The laws regarding headlights are not definite enough; they should specify the illumination and not the candlepower. The power of the light should be reduced, making a cylindrical beam instead of conical one.

G. L. Wilson, an acetylene headlight manufacturer, said that the burner should be exactly located at the focal point of a parabolic mirror; a 9-in. diameter is the best. There should not be too much diffused light directly in front of the engine. Careful study should be given to the design of the lamp.

J. F. DeVoy of the Chicago, Milwaukee & St. Paul said that the electric headlight was not suitable for terminals, but has advantages in other places.

Several engineers spoke of the advantages of the electric headlight and stated they would be willing to pay for them out of their own pockets. Several cases were mentioned where accidents have been avoided by their use. The electric headlight provides a shaft of light that will give warning at crossings. Classification signals can be given by hand.

W. Alexander, master mechanic of the Chicago, Milwaukee & St. Paul, said that it was impracticable to turn off the electric light at every signal. Yard men find it difficult to work where the electric headlight is used. It is good on single track, but not so advantageous on double track.

Professor J. G. D. Mack of the University of Wisconsin said that high power lights should be given more practical road tests. Engineers may be able to read phantom lights correctly with practice. Generally most engineers favor the high power light. It is still more blinding in foggy weather. Amber glasses are no good, for they eliminate the blue.

The meeting closed at midnight.

GERMAN RAILWAY PROMOTER HONORED.—The railway employees of Saxony purpose to join with the people of Leipsic in raising a statue of Frederick List in front of the new station there, as to the chief promoter of the first commercial railway in Germany, and of a German railway system. List was an exile from Wurtemberg; lived some years in Reading, Pa., where he was interested in railway lines then building, and went back to Leipsic as United States consul under Andrew Jackson.

## THE MANIBILL.

The recent adoption by all of the express companies of a form of waybill so made out that there must be a separate sheet for each shipment, and a statement on the same subject in a recent paper by Mr. Donaldson, of the Pennsylvania Railroad (*Railway Age Gazette*, September 6, page 443), have served to call renewed attention to the economy and other attractive features of this plan of having a separate waybill for each shipment; and D. C. Boy, assistant chief of the Educational Bureau of the Central of Georgia, in the freight department of which road individual waybills have been used for a dozen years, has given us an interesting account of its experiences.\*

The word manibill means many bills; three printed forms and two carbon sheets are filled up at one writing, at the sending station. On the Central of Georgia the waybill proper is the natural manila color; the next sheet, which is the freight bill, is white, and the third, which is the sheet to be signed by the consignee, is pink. The size of the sheet is 7 in. x 8½ in. One tissue sheet is placed between the first and second of the above-named sheets, for the forwarding agent's record and another, when desired, may be inserted between the second and third. Information given on the waybill which is not desired on the other two sheets is written close to the top and the lower sheets, when torn off, are about an inch smaller than the waybill.

Apart from the obvious economy in writing, the use of the manibill has resulted in two marked advantages; (1) the use of the typewriter and (2) added facility in checking freight when unloading. The manibill is not to be credited with the advantages which are derived from the use of typewriting machines, but at the same time it is a fact that by the introduction of this change the use of typewriters has been extended, even where the manibill is not used; and to the reader the advantage of typewritten lines needs no demonstration. Also the waybilling can be done as fast as the shipping receipts are ready, whereas if a blanket sheet were used it would be necessary to assort shipping receipts and wait until there were enough for one destination to make it worth while to put the large blanket sheet into the machine.

In the matter of checking out freight from cars, at first thought one would think that to handle twenty, thirty or forty separate sheets would be a slow process compared with picking out items from a large blanket sheet; but the testimony of the tallymen is that the separate sheets are really more convenient. This favorable result is accomplished by the simple expedient of arranging the bills in alphabetical order. The freight men on the Central of Georgia say that they feel pretty sure that, as compared with a single large blanket sheet for a car, the separate individual sheets are equally convenient; and in cases where it would be necessary to handle two large blanket sheets, when unloading a car, they are quite sure that with separate sheets, alphabetically arranged, the work can be done quicker. As we have before stated, the number of shipments on the Central of Georgia under the old plan averaged only 1.16 per waybill so that actually, with the reduced sizes, there is less paper used now than under the old plan.

The advantages of the manibill system as summed up by W. D. Beymer, comptroller of the Central of Georgia, are as follows:

1. At the billing station: (a) Manibills are ready for delivery to conductors immediately on completion, there being no delay for copying. (b) The manibill is peculiarly adapted to the typewriter, and as compared to single consignment waybills, twenty-five per cent. better speed is made therewith. (c) Impression copies may be taken at the con-

venience of the forwarding agent, relieving the tension during the rush at the close of the day's business. (d) By the use of the conductor's manibills delay to train, as well as work, is avoided at destination.

2. On the road: The advantages en route might appear to be negligible; nevertheless, there are three distinct advantages: (a) The manibills are generally typewritten. (b) They carry but one consignment. (c) They provide a freight bill and delivery receipt for freight consignment to non-agency stations.

3. The receiving agent naturally benefits most, and the advantages to him are as follows: (a) Freight bills being already prepared, he is required to make copies only for such as are so corrected that new bills are necessary. (b) If the original billing is sent to the accounting department he is saved the expense and labor of writing a detailed report. (c) Expense of typewriters for making expense bills (freight bills) at destination is saved. (d) Freight can be delivered more promptly. (e) By retaining a copy of the freight transcript, the receiving agent has an extra copy of the document upon which the freight moved. (f) Errors in transcribing are avoided.

Quoting O. M. Ezell, agent of the Central of Georgia, at Atlanta, Mr. Beymer says that all of the objections of the most radical opponents have been met and done away with. Mr. Ezell further says:

"From a traffic standpoint I consider the use of the manibill especially valuable at a large competitive point due to the fact that the freight bill and delivery receipt can be placed with the cashier while the freight is actually being discharged from the car, and consignees inquiring by telephone in regard to expected shipments can be given accurate information without delay. Under the old system of expensing it was often the case that freight would be unloaded in the warehouse from one to three hours before the cashier was furnished with freight bills and often consignees would erroneously be advised that shipments had not been received.

"I consider the station record afforded by the use of the manibill from a forwarding standpoint is much superior to the old waybill in that the hard tissue copy, especially when typewritten, is much more legible than the old impression copy which was obtained from the waybill made out in copying ink or pencil. Very often this record was absolutely illegible.

"The use of the manibill has encouraged the installation of typewriters at a great many small stations, which, of course, has improved records at such points, and I believe it has also been largely responsible for the use of typewriters in billing by lines who do not specially favor the manibill. One objection that has been offered to the manibill has been the presentation of corrected freight bills for collection. My experience at Atlanta has not borne out this objection. Freight bills on which the charges have been reduced are always acceptable; and where it is necessary to increase the amount, the original figures are erased or a new expense bill is made. Very little time, however, is lost by this and I do not recall a single complaint received from the public from this source."

At Savannah the whole cargo of a ship is unloaded about every day at the wharf of the Central of Georgia and the checkers there favor the manibill system unanimously.

It will be recalled that Mr. Donaldson, of the Pennsylvania, in his account of the experimental use of this idea on his road said that the agents at the forwarding station made out notices to be sent to the consignees. The Central of Georgia has never had notices thus made. Mr. Beymer estimates that at least 75 per cent. of less than carload shipments are delivered immediately without the necessity of having any notice sent. Moreover, a notice on a large sheet must be enclosed in an envelope and postage paid for it at the

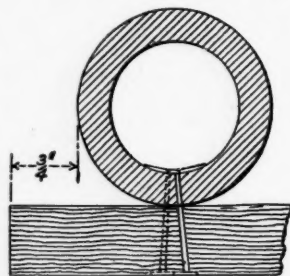
\*The Central of Georgia practice was described in the *Railroad Gazette*, March 15, 1901, and November 4, 1904.

rate of two cents. The results of the Pennsylvania's experiment will be of interest, however, for the requirement that a notice shall be sent to every consignee is becoming more and more general. Indeed, it may be looked upon already in many situations as a legal obligation. It has also been observed that the fact that postal cards when not delivered by the post office are not returned to the sender sometimes causes inconvenience. A notice for which two cents is paid comes back and the agent is thus warned to hunt up the consignee. The additional cent on a sealed envelope is not wholly lost, as on the Pennsylvania it has been found practicable frequently to send two or a larger number of notices in the same enclosure.

Mr. Boy informs us that the manibill is now being used experimentally by the Chicago, Rock Island & Pacific and by the Norfolk & Western.

### A BAGGAGE CUSHION.

A rubber mat made of old air brake hose is one of the passenger station facilities recently adopted on the Cumberland Valley, and its use has been found very satisfactory. According to the statements of an officer of the road, this cushion is used in the baggage room, in unloading baggage from the trucks. There is a large field, we believe, for a device of this kind outside the baggage room; that is to say, on the station platform where trunks are unloaded from trains. Whether the mats are used for that purpose on the Cumberland Valley we are not informed. A mat consists of 24 pieces of hose, each  $22\frac{1}{4}$  in. long, nailed across four strips of hard wood, each 4 in. wide and 4 ft. 4 in. long. It is thus  $22\frac{1}{4}$  in. x 52 in., or something more than twice as long as it is wide. The manner of fastening the hose is indicated in the accompanying drawing. An iron rod is inserted in the hose when the nails,  $1\frac{1}{2}$  in. long, are driven, and thus they are clinched.



Method of Fastening Hose to Wooden Frame of Cushion.

### THE "DEAD LINE" AT FRISCO STATIONS.

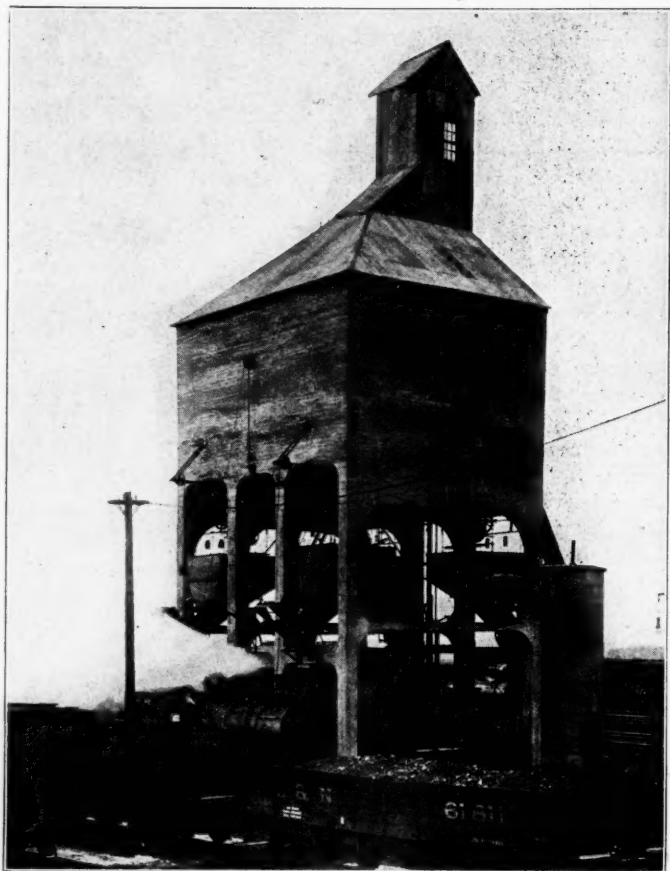
The Frisco has adopted a novel and simple method for keeping employees and passengers on its station platforms from being struck by trains. Last April General Manager W. T. Tyler had a broad white line painted the full length of every platform parallel to the track, and 5 ft. from the edge of the platform and 7 ft. from the nearest rail. An order was then issued that no truck should be allowed beyond this line when a train is moving. All trucks must be moved inside of it after the train has stopped, and outside of it again before the train starts. Obedience to the rule will prevent trucks or employees from being struck, and eliminate a cause of a good many accidents.

There is no rule governing the movements of the passengers over the line, but it is found that a large majority instinctively grasp the significance of the white line, and even on crowded platforms stay on the safe side of it. A good many passengers, employees and other persons are killed and injured annually at stations, and it seems worth considering whether the general adoption of the simple measure employed by the Frisco would not materially reduce the number of fatalities and injuries at stations.

### CONCRETE COALING STATION.

By C. P. Ross.

The coaling station built by the Kentucky & Indiana Terminal at Louisville, Ky. to replace the wooden station that was burned recently is of reinforced concrete construction and of the Holmen counterbalanced bucket type, having a capacity of 500 tons. It is an example of the best modern practice in this type of structure and is made fireproof as far as consistent with such practice. The plant was built on the foundations of the old coal chute which was of the old style chain and bucket conveyor type and was supported on a heavy foundation which had the appearance of a large reservoir. It was necessary to remodel a portion of these foundations in order to accommodate the Holmen elevating equipment. As this coaling plant is to supply coal to engines used by the Chicago, Indianapolis & Louisville, the South-



Concrete Coaling Station of Holmen Counterbalanced Bucket Type.

ern, and the Baltimore & Ohio, it was necessary to weigh all coal delivered by the coal chute and store the three different kinds of coal used by the three different roads in separate compartments.

The coal brought to this plant is discharged into a 20-foot concrete receiving hopper having a 1-in. neat cement sidewalk finish. The coal is fed from the track hopper to the Holmen bucket by a  $2\frac{1}{2}$  ton capacity Barrett revolving measuring feeder. This feeder is automatic in its action and delivers a definite quantity to the Holmen bucket. The guaranteed elevating capacity of the plant was 75 tons per hour, but it has elevated 100 tons in actual operation. The plant itself may be handled by one man, but laborers are necessary to dump the coal from the cars into the pit.

The power is furnished by a 21 h. p. General Electric motor, direct connected to a Roberts and Schaefer Company Holmen hoist. This motor is equipped with a solenoid brake to prevent

dropping the load in case the current is cut off and also Hatch limit switches which cut out the current in case the bucket is hoisted above the discharge point. The Holmen bucket is automatic in its discharge and with the arrangement of by-pass chutes at the top, which are controlled from the hoist house, the coal may be distributed into either one of the four pockets.

The gates in the bottom of the coal bin are of the undercut type and counterweighted so that they may be opened by a rope from the ground. The coal from the gates passes into four 12-ton capacity steel weighing hoppers hung on hanging scales with plus and minus beams and a registering device, which records the exact draft of coal delivered to each locomotive and prints this weight on duplicate tickets; one of which is held by the coaling station operator, the other being taken by the fireman of the locomotive. The weighing hoppers are also equipped with easily operated undercut gates, which are under the control of the fireman on the tender or on the ground. The coaling aprons are properly counterweighted and are equipped with heavy hoods for deflecting the coal directly into the tender. The four scale beams are located at the ground level, being enclosed in separate houses.

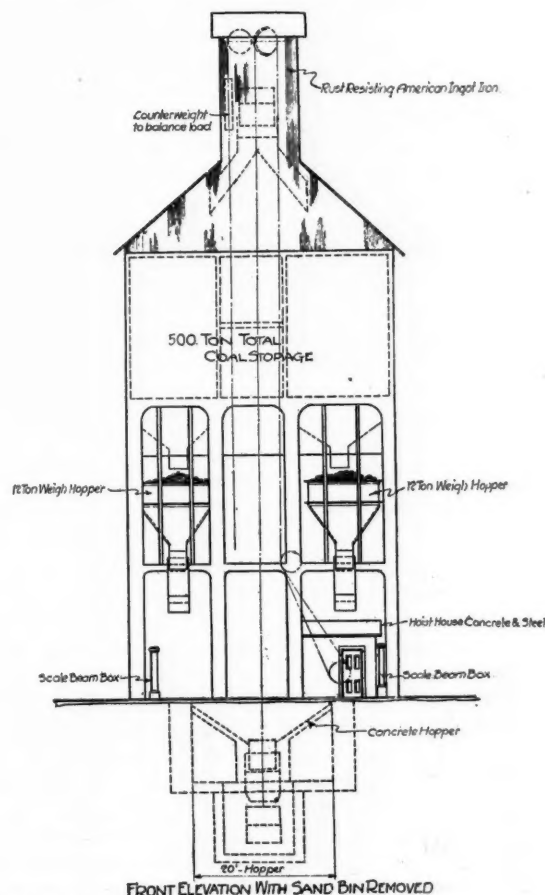
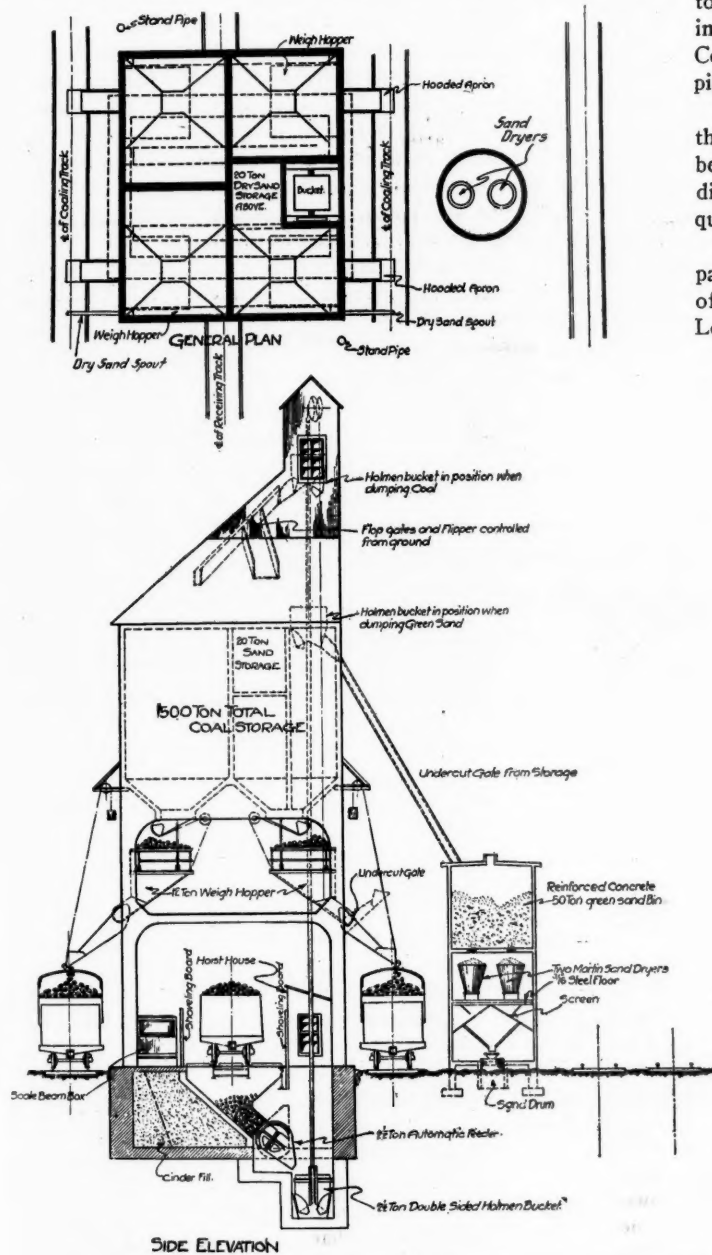
It was also necessary to supply the locomotives with sand, and consequently a reinforced concrete sand plant was installed

in connection with the coaling chute, using the method successfully employed by the Pennsylvania Railroad. This sand handling plant is of the gravity type which practically eliminates the use of hand labor. The wet sand is dumped into the receiving hopper in the same manner as the coal, and elevated in the Holmen bucket. There is a deflecting plate in the bucket which discharges the sand at its proper dumping point into a steel channel chute, having an inclination of 60 degrees. This wet sand is stored in a 50-ton wet sand bin of circular construction, built of reinforced concrete. There are gates in the bottom of the bin which feed the sand to two coal burning sand dryers directly underneath. They are kept constantly filled.

These dryers are located on a steel plate floor in the drying-room, and the dry sand passing from the dryers flows over screens into a hopper. Any foreign materials such as chips, pebbles, etc., are caught on the screen and fall to the side where they are removed. The clean dry sand is gathered in a hopper which is located directly over a steel sand drum in the lower compartment of the sanding plant. The sand is forced from this drum to the reinforced concrete dry sand storage pocket in the structure by compressed air at 75 lbs. pressure generated by a Westinghouse direct connected electric air compressor. The radial bends in the elevating pipe are made of manganese steel to withstand the wear due to the sand blast. The dry sand tank in the storage pocket is connected to two Roberts and Schaefer Company standard telescoping sand fixtures by a 3-in. discharge pipe.

The wet sand storage bin is equipped with a loading spout so that wet sand for a season's supply coming in foreign cars can be dumped, elevated and discharged into the wet sand bin and direct from this bin into company cars where it is stored in quantity preventing demurrage charges on foreign cars.

This plant was constructed by the Roberts and Schaefer Company, Chicago, under the jurisdiction of F. J. Parrish, engineer of maintenance of way, of the Kentucky & Indiana Terminal, Louisville, Ky., and is operating successfully.



Concrete Coaling Station of 500 Tons Capacity at Louisville, Ky.; Kentucky & Indiana Terminal.

## DROP BOTTOM CAR DOOR OPERATING MECHANISM.

The Empire door, shown in the drawings, is claimed to be an improvement in the door operating mechanism for general utility transportation cars. The operating mechanism is located on the outside of the car, making it easy of application, inspection and repair. It can easily be painted and cared for and cannot be neglected without its being evident. Moreover, it is not subjected to the action of drippings from the material carried by the car or an accumulation of dirt from the roadbed.

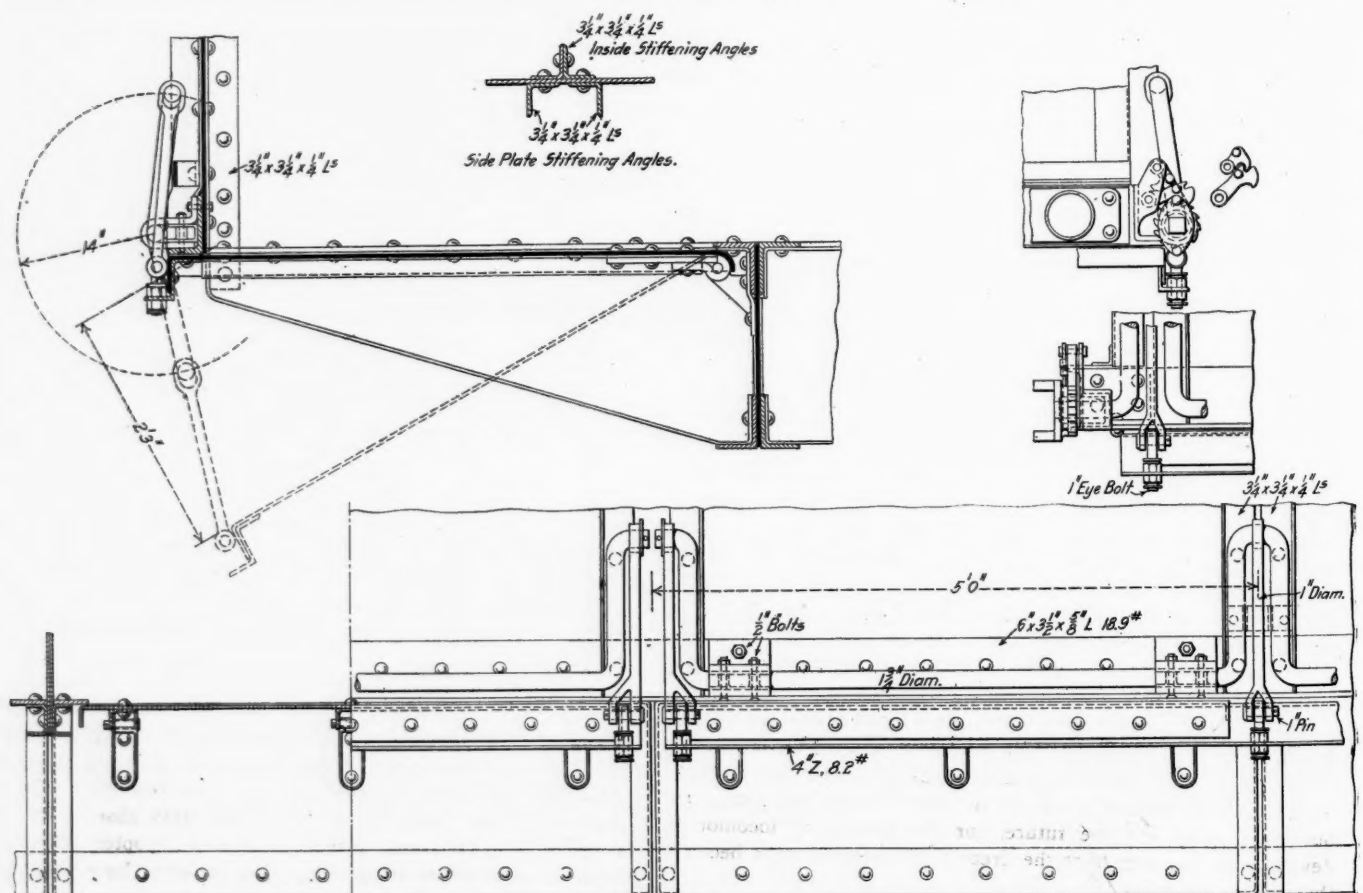
The car to which the illustration refers has eight doors at each side of its longitudinal center, there being two sets of door operating mechanism at each side of the car, each set being connected with four doors. If the two doors directly over the trucks should interfere with the trucks or truck wheels, it is an easy matter to have the winding shaft so constructed that a shorter link may be used, the two doors in question, however, being divided from the other two in the same lot of four by cutting the Z-bar under the front edge of the doors between the second and third door from the end.

The winding shaft is a  $1\frac{3}{4}$ -in. round steel bar forged as shown and the links are slotted where they go over the shaft in order that they may pass around the corners of the U arms. The links are forgings arranged with a jaw at the bottom to take the eye-bolts which in turn are secured to the Z-bar which extends under the outside edges of the doors; the eye-bolts are fitted with nuts as shown so that a tight adjustment can be obtained. Ratchet wheels with pawls and dogs are arranged at all four corners of the car; to open the doors the dog holds the pawl out of engagement with the ratchet teeth and a bar is inserted between the lugs and with a slight pull the winding shaft arms go over the center of support and the doors drop. There are very few castings in this mechanism, and being composed almost entirely of forgings repairs can be easily made.

Another advantage is that it gives a free opening for material to issue from the doors, the arms lying between each pair of doors. There are no chains, racks or gears to get out of order and with the type of car illustrated the U arms in their upright position will lie between the side stiffener angles, in this way being more or less protected from side-wiping. The Empire door is the invention of E. D. Hillman, mechanical engineer of the U. S. Metal and Manufacturing Company of New York, which company will market the device.

**NATIONAL RAILWAYS OF CHINA.**—It is said that the scheme of providing a system of national railways for China includes three trunk lines with eastern terminals at Canton, Shanghai and Tientsin.

**ITALIAN RAILWAY ADMINISTRATION.**—There has been a reorganization of Italian state railway administration. Heretofore under the central office there were 12 subordinate divisions of equal authority. By the new arrangement there are four chief departments for operation and seven subordinate departments ("central services"). The main departments are train service, traction, cars and labor. The subordinate services, secretaryship, personnel, hygiene, law, finance, commerce and accounts. A separate office has charge of the important steamer service, another of local lines, and a third is for settling accounts with the three corporations which worked the lines before the state took them over. The traction and car departments have their headquarters in Florence; for the Sicilian local lines the office is in Palermo, and all the other offices are in Rome. Under this general management are 12 district managements, with seats in Turin, Milan, Bologna, Venice, Genoa, Florence, Rome, Ancona, Naples, Bari, Reggio and Palermo. The heads of these district managements are to exercise a general supervision and are also to keep in close touch with the population.



Empire Drop Door Operating Mechanism for General Service Car.

# Maintenance of Way Section.

THE convention of the Bridge and Building Association held this week in Baltimore was in many ways one of the most successful meetings ever held. While the attendance was not as large as at some of the previous conventions, because of the location, the character of the reports and discussions was above the average. The report on turntables was a specially strong one and showed the possibilities for the thorough study of a subject, which is presented in committee work. The importance of aggressive committee work to the welfare of an association has been frequently emphasized in these columns, for it is through the standards maintained in this work that the character of an association is reflected. In common with other associations, this association has difficulty in securing thorough work in all cases. One of the most important duties of the executive officers is to select members for the different committees who can be relied upon to prepare thorough reports.

ONE of the things which usually impresses a foreign railway engineer traveling in this country is the extensive use of concrete and the wide variety of its uses. We have become so accustomed to its widespread use in this country that it is difficult for us to realize how extensive is its adoption and how rapid its development has been. However, a comparison of this field today with that of ten or even five years ago cannot fail to impress one with its marvelous growth. The concrete trestle, the concrete culvert pipe, and the concrete freight house and station are all recent developments, while one of the latest is its appliance in thin sheets over steel work, etc., with a cement gun. The importance of this material in railway construction is illustrated by the reports presented at the Bridge and Building Association convention. Out of nine reports presented, three dealt entirely with the uses of concrete—concrete tank construction, reinforced concrete culvert pipe and the relative merits of brick and concrete in railway building—and platforms—while three other reports recommended the use of concrete for other details. Concrete is rapidly coming to be the universal material for permanent construction work, and it is still probably in the early stages of its development.

EVEN more marked than the continual reconstruction of bridges to accommodate longer and heavier engines is the renewal of turntables, emphasizing probably more strongly than any other detail of railway construction the failure of the railways to adequately anticipate future requirements. It has been almost universally the case within recent years that turntables have been replaced long before their normal life has been reached, because of increase in the size of the locomotives, and tables have frequently been replaced after service of five years or less, when comparatively new. While there is a limit from an economic standpoint to the amount one is justified in spending to anticipate future requirements, this limit has seldom been reached, but on the contrary the railways have fallen so far short of it as to make the result very uneconomical. Although in replacing a bridge there may be little waste of material, there is a large percentage of loss in the rebuilding of a turntable, for the old circle wall and floor are not only useless for the new table, but are an actual expense to remove. Furthermore most turntables are constantly in service and arrangements must be made to continue uninterrupted service during the alteration, which adds to the expense and difficulty of performing the work. While the cost of tables increases out of all proportion to their length, it would seem advisable in view of past experience to build still more for the future, for the history of locomotive development has been that the dreams of yesterday have become the realities of today.

MUCH interest is being manifested in the safety contest now being conducted in the maintenance of way section. The widespread interest in the safety movement in all lines of industry is evidenced by the Safety Congress held at Milwaukee three weeks ago, and by the safety mass meeting for railway employees which will be held in Kansas City on October 19. Desiring to bring the methods which have proved valuable in decreasing the number of injuries to maintenance men in one vicinity to the attention of others engaged in similar work elsewhere, we have announced this contest, and it is hoped that those who have given the subject study will take advantage of this opportunity. The improvement may be in the plan of organization of forces, or it may consist in the elimination of dangerous conditions on the work, or again, it may lie in the education of the men themselves against taking undue chances. We will pay \$25 and \$15 for the two best papers received and will pay our space rates for all other contributions accepted and published. All contributions should be sent to the Civil Engineering Editor, *Railway Age Gazette*, 417 S. Dearborn street, Chicago, by October 25, in order to be considered by the judges of the contest.

A SHORT time ago a roadmaster on a western road was laying some temporary tracks in a terminal, and at one point a crossing was necessary. The tracks had been staked out by the engineer and a crossing ordered for this point. In going through another part of the yard the roadmaster found a second-hand frog in good condition of approximately the same angle as the new one desired. He promptly cancelled the order for the new frog, substituted this old one, and saved perhaps \$250. Neither the division engineer nor the roadmaster knew that this old crossing existed until it was accidentally found. Such instances illustrate the advisability of having some sort of a record of the extra and second-hand crossings on hand, so that they can be worked in whenever an opportunity offers. Some roads supply this information to the division engineers in the form of a list giving the angle, weight of rail and type of all crossings on hand, which is revised monthly. These crossings accumulate in a number of ways and the total capital tied up in this stock is considerable. Many second-hand ones which are still good for considerable service are released by track changes. Many unused ones held for emergencies at important points are released in the same way. Frequently temporary track layouts require special crossings for only a short time, and when these tracks are removed the crossings are too good for the scrap pile. If the engineer has information concerning these crossings he can frequently adjust the layout of temporary tracks, industry spurs, etc., to use some of them in place of new ones, in this way saving the cost of the new ones and reducing the stock of material on hand.

THE adoption of a piece work or contract system in the maintenance of way department has met with little favor in this country, in marked contrast to the practice in many foreign countries. For this reason the description of this system on the Jamaican government railways in this issue will be interesting to American railway men as illustrating the extent to which such plans may be carried. While those accustomed to conditions in this country believe that the application of machinery to maintenance work is in its infancy, it is more widely used here than elsewhere. Many of the labor-saving machines commonly used here are unknown in other countries. On the other hand, and partially resulting from this absence of machinery, the piece work system is widely adopted elsewhere. American contractors engaged in grading work have long used

the piece work or small contract system where the employment of steam shovels or other heavy machinery is not practical and the use of "station men" provides a very satisfactory means of performing work. As an example of the extent to which this is carried, in the construction of the Oregon Trunk in central Oregon, practically all the grading amounting to over 7,500,000 cu. yds. of material, over 80 per cent. of which was rock, was moved in this way. The general practice is to do all work with company forces paid on a day basis regardless of the amount of work done. Because of the character of much of the foreign labor now employed, it is seemingly impossible to secure efficient results on a day wage basis, and there is a tendency on several roads to try out some form of small contract system for routine maintenance. The Michigan Central is contracting for the application of stone ballast, as described in the *Railway Age Gazette* of October 20, 1911. One road planned to contract the renewal of ties on a portion of its line last year, but labor difficulties necessitated the temporary abandonment of the experiment. Another road has arranged with one section foreman on each of several divisions to do the regular maintenance work on his section this year on a contract basis, furnishing him with the necessary material, and allowing him to hire his labor, to pay any rate he chooses and to handle as best he can, subject to the supervision of the track supervisor. The results of these and other experiments will be watched with much interest.

ONE does not hear as much discussion of the quality of waters for locomotive consumption as he did several years ago. This is largely due to the important progress made within recent years in the treatment of water to remove the objectionable contents. In many cases the use of surface reservoirs has been resorted to, especially in the central states. While the first cost of land, grading, etc., for them is high, their cost of operation is usually low, the water usually requiring little if any treatment. Where deep well plants are already in operation, or where sites are not available for surface reservoirs, treating plants are now quite generally installed. The number of treating plants is continually increasing, as the economy of their use is becoming more widely realized. In the hard water belts, such as are found through Missouri and Kansas, treating plants are located at nearly all water stations on the more progressive roads. With the increasing trainloads and density of traffic it is more necessary than ever to reduce the number of engine failures to a minimum. The large amount of study given to this subject in recent years, and the development of treating methods adapted to different conditions, are important means in promoting regularity of railway operation. Important economies are also being effected in the operation of pumping plants. The experiments now being made with engines using crude oil and crude oil distillate, give promise of effecting important economies in the cost of operation, and the standardization of the pumps and engines used on a road simplifies the work of maintenance and repair. The wooden tank is fast being replaced with the steel tank, with its larger capacity, longer life and lower cost of maintenance. Reinforced concrete is being used to a limited extent, several tanks of this material having been built. However, the use of this material is still experimental, and it has several important disadvantages which many believe will prevent its widespread adoption. An interesting development on some roads is the substitution of the cylindrical steel standpipe for the more common tub on posts. This type of standpipe has recently been adopted on the Lackawanna, and has also been used to some extent on the Santa Fe and other roads. The installation of track pans to enable engines to take water without stopping is increasing somewhat, as the proportion of fast passenger traffic increases. Their use, however, is still confined to a comparatively few roads in the eastern states. It is becoming more generally the practice to erect the storage tank some distance from the track and place

spouts or cranes adjacent to the tracks, water being delivered to the engines through these cranes. In this way track changes can be made at any time with less interference with the water supply. These and other improvements indicate that steady progress is being made in providing better and more economical water service.

#### COMPETITION IN MAINTENANCE WORK.

THE argument which is made by Mr. Stevens in his letter in this issue that some means of comparison of the work done by different foremen is essential to the promotion of efficiency results, is a most important one. The amount of money devoted annually to the maintenance of track and structures forms such a large proportion of the total operating expense of the railways that every legitimate means should be adopted to secure the maximum returns for the expenditure. It is difficult to stop leaks until they are discovered, and it is hard to discover them until some means is adopted of measuring the efficiency of one man as compared with another. When this is done special attention can be given to the weaker man to aid him in raising his standard of work to the level of his fellows, or he can be replaced with a better man.

In general, the higher officers know only in an indefinite way the relative abilities of different supervisors, while the supervisors themselves know to a less degree the comparative work of their foremen. A man may be considered above the average because he has better track, but analysis may show that he has been allowed more men, has used more materials, or has a less amount of detail work aside from the track to take care of. Frequently a study will show that one man's track is costing more per mile than that of his neighbor, whom he is supposed to excel. On most roads the main lines outside of terminals are divided into sections of approximately equal length, and the foremen are then allowed an equal number of men for each section. While the main line mileage and the climate and traffic conditions will be the same, one section may have new rail and ballast, while on another the rail may be nearly ready for removal, the number of turnouts may vary widely and a large amount of extra work may be caused by the presence of water stations, street crossings, etc. This latter detail, which is frequently overlooked was discussed at some length at the recent convention of the Roadmasters' Association at Buffalo, and it was agreed that four paved street crossings were equivalent in the amount of labor required for maintenance to one mile of main track. In general, the roadmaster or supervisor knows only in a vague way what one foreman is doing in comparison with another, while the foremen themselves knowing that their conditions are so unequal, realize that their work cannot be compared with that of their neighbor's and do not have any incentive to increase their efficiency. Under such conditions it is not surprising that the men do their work in a more or less perfunctory way. No man, whether he be general manager or section foreman, is at his best unless he feels that it is necessary for him to exert himself to retain his position. If he knows that the work he has to do is made as nearly equal as practicable to that of others holding similar positions, he will strive to keep pace with his fellows, and the healthy competition so created will be reflected in a general raising of the standards of the entire work. One reason for the decline in track maintenance is the perfunctory way in which it has been allowed to proceed. The application of better methods will enable better work to be secured at less cost. The railways generally spend enough for maintenance, but in many cases they do not secure all they pay for, because of incompetent or lazy supervision.

The equating of the different conditions governing the amount of work required on sections should not be impracticable, and on such a basis it should be possible to detect inefficient supervision, and then either correct or eliminate the offender.

## Letters to the Editor.

### EQUATING MILEAGE OF TRACK SECTIONS.

READING, Pa., September 23, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In studying the subject of efficiency of maintenance of way forces we find that one of the important, if not the most important, matters to decide is the selection of a basis on which a comparison of results can be properly and equitably made. The American Railway Engineering Association has adopted a classification of tracks, separating them into three grades according to the amount of traffic passing over them. I believe that the basis on which the classification is made is the right one, but that there should be a more complete and more comprehensive classification so that a more accurate adjustment of forces could be made with reference to the work to be done. I think we should equate the mileage of each section and subdivision, and then assign to each its proper allotment of available men on that basis, because by making a just and equitable adjustment of forces to the work to be done we could hold each foreman responsible for equally satisfactory results.

To do this accounts must be kept. We must enter in a book a record of the mileage of each class or grade of track, each turnout and its ratio, each slip crossing and other combination, and whether interlocked or hand operated. A statement of all jobs to be done by the section forces should also be compiled, and each item made equal to a certain amount of equated mileage on a fair basis to be agreed upon.

It is, of course, evident that a turnout requires some additional mileage allowance, the double mileage of the interlaced tracks being hardly sufficient, but the percentage that should be added to make the equivalent mileage of the different classes of track that come together at the frog would have to be adjusted; then the equated mileage of each section and each subdivision would make a proper basis of comparison, and as each section would be charged with all labor and all material supplied to it, a statement of cost of maintenance per mile of equated mileage could be made at any time, that would, if the work had been properly done, show the relative efficiency of each section foreman and of the supervisor as well. In this way it would be possible to introduce real competition for promotion based strictly on merit.

The factor that has the greatest effect on methods, practices and customs in handling work and accomplishing satisfactory results on a railway is density of traffic. The cost of maintenance varies in about the same ratio as the tonnage multiplied by speed up to certain limits. We cannot therefore properly lay down fixed rules to apply to all conditions, but must vary our ratios on the different subdivisions or divisions according to the character of road and the kind and volume of traffic.

There must be a basis of comparison, and some way to detect, without prejudice, the inefficient and unworthy and to create rivalry, competition and co-operation, or some way to make the sheep separate themselves from the goats automatically. Careful records of equated mileage and charges against each piece of track or section, covering everything supplied to it, will furnish the evidence needed for conviction of those who, through inefficiency or inability, do not accomplish satisfactory results. If one rides over a division and finds the limits of sections well defined without the use of section posts by the varying condition of the track, he knows that the supervisor or roadmaster is inefficient. On the other hand, if one finds practically uniform physical conditions and the forces well adjusted to the work to be done he knows that the supervisor is a competent man and is attentive to his business. Adjusted mileage would help the efficient and worthy men and force the others to proper exertion and the accomplishment of satisfactory results, or to leave the job and make room for someone better able or more willing to do

necessary work. We should try to put our forces on an even basis and then insist on uniform results.

F. S. STEVENS,  
Engineer Maintenance of Way, Philadelphia & Reading.

### CAREFUL HANDLING OF RAILS.

KINGSTON, N. Y., October 8, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

During the past year there have been a number of derailments caused by broken rails which were either due to some defect in the rails, or probably to some slight damage to the rail in handling. There are many ways in which a rail can be damaged which might result in a complete break sooner or later when placed under heavy strain. The rail is inspected at the mills before it is delivered, but between the time when it is inspected and when it is laid it undergoes considerable handling, as it has to be loaded before shipment is made, unloaded after reaching the desired points, and distributed as required.

We are all familiar with the circumstances existing where rail is being laid. Everything is humming, there can be no delays, the track must be in readiness for the trains at the scheduled time. Therefore, there is a strong possibility that injuries caused by handling rail, etc., will be overlooked. Also after the rail is placed in the track, the damaged portion is not visible to the trackwalker. There seems to be only one way to curb this danger, viz., to have a competent man thoroughly inspect every rail before it is placed in track.

Another common reason for rail breaking is its being damaged while being placed in the track when inexperienced men are allowed to spike the rails and in so doing strike the rails instead of the spikes many times. Rail put in by this class of spikers will eventually show signs of breakage. None but experienced spikers should be allowed to spike rail, and the foremen should put forth their best efforts to make good spikers of the men, as this is an all-important matter in track laying. In large gangs, it is a common thing to find but very few men capable of spiking rails. I should suggest, therefore, that the rail be carefully inspected after being installed, and that also a sharp lookout be kept for defects in the base of the rail.

JOSEPH J. MORGAN,  
Storekeeper, New York Central & Hudson River.

**MAINTENANCE COSTS ON NEBRASKA RAILWAYS.**—Engineering and superintendence on Nebraska railways cost \$1,034.67 per roadway mile and \$810.15 per track mile, or 2.16 per cent. of the total value of roadway, equipment, etc. These figures are from the report of the Nebraska State Railway Commission.

**CHINESE RAILWAY CONSTRUCTION.**—The railway from Tientsin (the port of Peking) south by east to the Yang-tse-kiang river at Pukau, opposite Nanking, some 600 miles, has been completed with the exception of the long bridge over the Hoang-ho. Germans built the northern and English the southern half. It has been in operation, after a fashion, for some time; but by latest accounts, the trains required three days to run the 600 miles. As lines have heretofore been completed from Peking to Tientsin, and from Nanking to Shanghai, this completes a railway route from Peking to Shanghai—a very important line for China.

**ITALIAN RAILWAY EARNINGS.**—The Italian State Railways (pretty nearly the whole system of the kingdom) earned gross in the fiscal year ended June 30, 1912, an average of \$7,667 per mile, which is \$474, or more than 6½ per cent., more than in the previous year. The aggregate increase was \$6,428,000. There was even a small increase in the earnings of the steamship lines which the railways operate between Sicily, Sardinia and some smaller islands and the main land, in spite of the fact that a large number of the vessels designed for this service were diverted to the service of the army in Tripoli.

# STEEL TIES ON THE BESSEMER & LAKE ERIE.

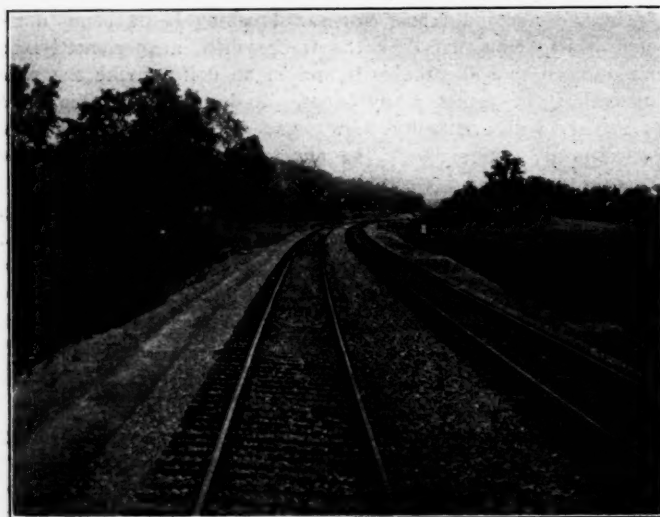
Results from Eight Years' Experience, with Over Eight Hundred and Fifty Thousand Now in Service Under Heavy Traffic.

The question of the source of the future tie supply is becoming more serious each year until now it is not a problem to be encountered in the far distant future, but within the next few years. A great deal of attention is being given to securing the maximum life possible from the timber available by treatment and by the use of tie-plates to protect the tie from mechanical destruction. However, in view of the rapidly decreasing timber supply such remedies are considered largely temporary, and a great deal of study is being given to the development of substitutes for the wooden tie. In most cases attention has been turned to ties of steel or concrete and a multitude of different designs have been worked out. A few ties of each of a large number of these designs have been placed in the track and are being carefully watched. While most of these have failed for one reason or another, ties of a few designs give promise of good results. The best known steel tie is the Carnegie, sometimes known as the Buhrer tie from its inventor. This has been made in larger numbers than any other metal tie, and is now used in railway tracks in sufficient numbers to warrant serious consideration.

The Carnegie steel tie is a simple, unsymmetrical I-beam section with a base considerably wider than the top. In the weight generally used for steam railways the base is 8 in. wide and the

8,078,547 tons; coal, 3,075,458 tons; other commodities, 3,016,497 tons.

This season a considerably heavier traffic is being handled. During the month of May, 1912, 1,104,000 net tons of ore alone were hauled, while in June 1,153,000 tons were handled, this being the largest monthly movement on record up to this time. An average of 56 ore and coal trains and four local freights and eight passenger trains pass over the line daily during the summer months. In addition the westbound freight trains of the Erie use the main line of the Bessemer road from Meadville Junction to Shenango, a distance of 20 miles, adding about ten movements daily between these points. Between Conneaut Harbor and Albion, a distance of 16 miles, consolidation engines weighing 391,000 lbs., with 225,000 lbs. on the drivers, are used. From Albion to North Bessemer, a distance of 125 miles, the trains are handled with consolidation engines weighing 336,000 lbs., with 180,000 lbs. on the drivers. For the last 91 miles of this distance two engines are required for the regular trains. The freight equipment is made up almost entirely of cars of 100,000 lbs. capacity, loaded with a 10 per cent. overload, so that the car axle loads range from 34,000 to 38,000 lbs. The run from Albion to North Bessemer is made



Section of Steel Tie Track on the Bessemer & Lake Erie.



Effect of Derailment on Steel Ties near Jamisonville, Pa.

top  $4\frac{1}{2}$  in. wide with a total height of  $5\frac{1}{2}$  in. The standard section weighs 20 lbs. per lineal ft., or 170 lbs. for 8 ft. 6 in., although the section used the last few years on the Bessemer & Lake Erie weighs 21.2 lbs. per ft., or 180 lbs. for the standard length of 8 ft. 6 in. It is fastened to the rail by bolts passing through the upper flanges of the tie and through steel clips extending over the base of the rail. Over 1,500,000 ties of this type are now in use, of which over 850,000 are on the Bessemer & Lake Erie and over 300,000 on the Union Railroad of Pittsburgh. Because of the very dense traffic, handled almost entirely in heavily loaded cars, the service of these ties on the Bessemer & Lake Erie is very instructive.

The main line of the Bessemer & Lake Erie extends from Conneaut Harbor, Ohio, on Lake Erie, to a connection with the Union Railroad near Pittsburgh, a distance of 142 miles, of which all but  $13\frac{1}{2}$  miles is double track. The line crosses eight water sheds, with a ruling grade southbound of .6 per cent. and northbound of .75 per cent. The principal traffic handled is ore southbound for the Pittsburgh district and coal northbound for Canadian and Great Lakes points. During the calendar year 1911 this road hauled 14,170,502 net tons of freight, composed of ore,

in about 12 hours, so that the freight trains make from 20 to 30 miles per hour on the down grades. The standard passenger engine weighs 253,200 lbs., with 103,000 lbs. on the drivers. These trains have an average running time of about 40 miles per hour, but frequently make above 60 miles per hour between stations. From these figures it will be seen that the loads on the track are very heavy and that a very severe service is demanded of it. In addition to the locomotives, the axle loads on the ore cars are such that almost every wheel is a driver in effect.

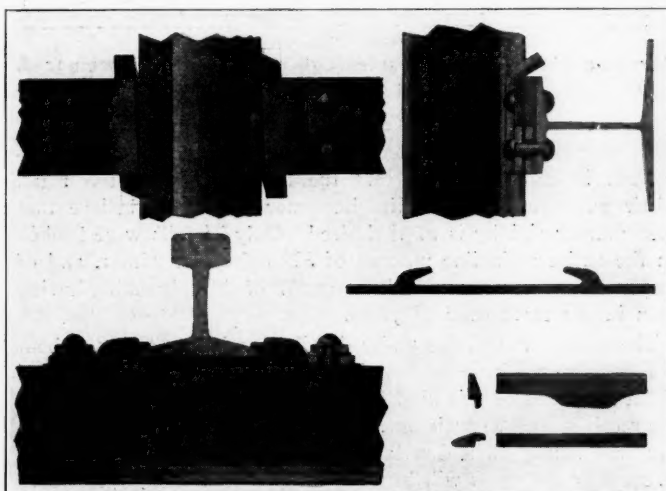
The first I-beam or Carnegie steel ties were placed in track of the Bessemer & Lake Erie near Claytonia in December, 1904, a lot of 1,200 being installed on a 4-deg. curve in slag ballast. These ties are still in track after a service of almost eight years. Since this time steel ties have been purchased and placed in track in the following numbers:

1905.....	24,736
1906.....	79,072
1907.....	144,679
1908.....	500
1909.....	116,168
1910.....	197,200
1911.....	139,235
	701,590

Between 150,000 and 200,000 additional steel ties are being placed in the track this year so that by the end of 1912 this road will have in excess of 850,000 steel ties in track. This will be equivalent to over 270 miles of track laid with steel ties, or about 43 per cent. of the entire mileage of the road. All ties renewed in main tracks and in important yards are replaced with steel ties, these being spotted in with wooden ties for renewals as well as being placed in all new main tracks, with the single exception that wooden ties are still being used for renewals where changes in tracks are contemplated at an early date.

The first steel ties placed in track weighed 167 lbs. each and were spaced 14 to the 30-ft. rail. With the first ties rolled a section was cut out of the web and put at right angles to engage the ballast and prevent the track from moving out of line. This weakened the tie, however, and after several had failed the practice was discontinued. The lower flanges were then bent down under each rail to secure a greater grip upon the ballast and to prevent slewing, but it is found that this is not required with the slag ballast used and the flanges have since been rolled flat. The spacing has also been reduced to the standard of 20 ties per 33-ft. rail, since which time the failures have been eliminated.

An important detail of a metal tie is the method of fastening



Carnegie Steel Tie with Wedge Fastening.

to the rail. As shown in the accompanying drawing, a steel clip with a lip extending up over the flange of the rail is bolted to the tie. One such clip is attached on each side of the rail. Round bolts were used originally, but difficulty was experienced with the clips turning. To prevent this a bolt was designed with an oblong neck extending through the clip, and no difficulty has been experienced with the use of this bolt. The same punching of the ties is followed for all weights of rail used on the road by varying the size and punching of the clip to fit the various rail bases. The same punching is now in use with rail varying in weight from 60 to 100 lbs. and is capable of further increase to 120 lbs. before the punching will have to be changed. Largely to avoid special punching of ties a standard gage is maintained on all curves, although there are some curves as sharp as 9 deg. on the main line. While this practice results in some increased rail wear, it has been found that no serious results are encountered. An additional clip is used on the outside of all curves.

In some instances on other roads a wedge fastening is used in place of the bolt and clip, although there are none in use on the Bessemer & Lake Erie. Owing to the fear arising several years ago that a derailment might clip off the bolts and loosen the track, the wedge fastening was designed to overcome this objection. However, because of the greater number of pieces the wedge fastening is slower to apply and consequently more ex-

pensive. For this reason it has not been adopted on the Bessemer, as the experience of this road has indicated that there is small danger of losing the bolts.

As the shoulder of the clip is in direct contact with the base of the rail it is impossible for the ties to slew to any extent. After the bolts have been tightened and have obtained their set, it has been found that there is little tendency for them to loosen. Because of the tight grip of the ties upon the rail each one acts as a rail anchor and creeping has been very largely



Steel Tie Lead in Cranesville Yard.

eliminated even under the heavy traffic on these grades. Contrary to the expectations of many, the track is not any noisier, if it is as noisy, as wooden tie track, as all these connections are tight. Also, because of these rigid connections the track remains constantly to gage.

While the steel ties are being spotted in between wooden ties wherever the latter need renewal, it is found that the life of the remaining wooden ties is shortened, for as the steel tie is shallower than the wooden tie the latter is forced to carry more than its proper share of the load and consequently deteriorates faster.

No shimming of track has been done on the Bessemer on the



Passenger Train Traveling 50 Miles an Hour on Steel Tie Track on a Six-Degree Curve with Six Inches Elevation and Gravel Ballast near Meadville Junction, Pa.

steel ties, even during the recent excessively severe winter. While the track heaved considerably in some cases, it was not enough to endanger traffic, and, in fact, it is believed that the heaving is less with steel ties than with wooden ties, this being explained in two ways. Because of the rigidity of the steel tie track it will act more as a unit to resist heaving and maintain better surface. Also, it is believed that the steel tie serves as a better conductor of cold and distributes the



ing fiber between the plate and the tie as shown on the accompanying drawing. These ties were installed in June, 1906, and the insulation is apparently in as good condition as when put in. On August 28 an inspection was made and in testing the track for resistance it was found that the average resistance from rail to rail on the insulated ties was 2.15 ohms, while the average resistance on the wooden ties adjacent was 2.58 ohms, indicating that the insulated steel tie was giving almost the same degree of insulation as the wooden tie. On the Pittsburgh & Lake Erie 3,000 Carnegie ties were insulated by placing the fiber directly between the regular steel tie and the rail without any protection of any sort. Although this fiber has been in service five years, the supervisor in charge of this section reported a few months ago that he had had no trouble up to that time, although the fiber has seriously deteriorated as would be expected after this length of time and with this method of insulation.

About 30 sets of steel switch ties are now in service on the Bessemer and 20 additional sets will be installed this season. Before the use of these special switch ties the ordinary 8 ft. 6 in. steel track ties had been interlaced in a number of instances through leads with satisfactory results. The switch ties are punched for the main line fastenings in the shops and for the lead rails in the field with a small hydraulic punch. The guard rails are secured by the standard clips and bolts. In a number of cases steel ties are also used for head blocks.

The 8 ft. 6 in. steel tie costs about \$2.15 without fastenings, which cost 20 cents per tie additional. In addition more ballast is required with steel than with wooden ties. While this is practically double the first cost of the ordinary wooden tie, practically half the cost of the tie itself is recovered when the tie is sold as scrap. Although no ties have been in track a sufficient length of time to enable definite estimates to be made of their life, the experience on the Bessemer road leads those in charge to estimate that this life will reach 20 years. On this basis a steel tie presents an interesting study of possible economies.

Briefly, the advantages of the steel tie as based on the experience of the Bessemer & Lake Erie are, that it holds the track to line and surface better and at less expenditure of money, the track is always to gage, rail wear is more uniform because of a firmer support and the absence of canting, and the clips act as rail anchors. The principal disadvantage of the steel tie is its higher first cost. It also requires larger track gangs when track is to be lined, while because of the bolt connections it is more expensive to remove ties for any reason or to relay rail.

## THE ASSISTANT FOREMAN.\*

By P. J. KEENAN,

Supervisor, Erie, Cuba, N. Y.

The proper way to handle the foreman question is to get one or two Americans as trackmen on each section, endeavoring to pick out men who have some education, with the understanding that if they develop they will be considered in line for promotion. If these men cannot be secured on every section, a special effort should be made to have the best and most experienced foreman have one or two such men so that they may profit by the foreman's ability and experience. After these men have worked a sufficient length of time those who do not measure up to requirements may be considered unfit to become foremen. On the other hand, those who show some ability and a desire to continue in this line of work should be encouraged both by foremen and supervisor.

They should be paid one or two cents per hour more than the other trackmen and taught to handle the work, especially in regard to surface and line. They should be taught the use of level and spot board in surfacing track and be allowed to handle the gang at different times while it is engaged in this

kind of work, but only under the direct supervision of the foreman in charge. They should also be instructed in the care and maintenance of frogs and switches and how to make repairs. They should be familiar with the method of keeping time, making out the necessary reports and in general become as well versed in the duties of a foreman as possible. If it becomes necessary for the foreman to be absent for a short time, one of these men should be allowed to take charge of the gang and the work done while he is in direct charge carefully noted. During the summer, while extra gangs are employed laying rail, putting in ballast, changing switches, etc., as many of these men as required should be used as assistant foremen, at an increase in pay, as the experience gained in extra gang work will prove very beneficial when they are placed in charge of sections.

A man of average ability who has acquired from two to four years' experience, as outlined above, should be fitted to take charge of a section and do the work successfully. One of the greatest advantages of this method is that the man is taught to do the work in the way required by the company which expects to employ him.

## ABSTRACT OF ENGINEERING ARTICLES SINCE SEPTEMBER 20.

The following articles of special interest to engineers and maintenance of way men, and to which readers of this section may wish to refer, have appeared in the regular weekly issues of the *Railway Age Gazette* since September 20:

Electrical Equipment for a Bascule Bridge.—A description of the installation of the electrical equipment to operate the Chicago & Western Indiana double deck, single leaf, Strauss, heel trunnion bascule bridge over the Calumet river near South Chicago appeared in the issue of September 27, page 575.

Cost Accounting in the Engineering Department.—An outline of a method which is now being used on the Northern Pacific for distributing the charges for construction and maintenance work appeared on page 578 of the issue of September 27. It was illustrated with several typical forms.

Weight of Rails in Track.—The amount of rails of the different weights in 244,496 miles of main track in this country was given in the issue of September 27, page 584. This weight was divided for all weights, 56 lb. and less, to 141 lb., and further subdivided between Bessemer, open hearth and special alloy rail.

The Buckwalter Electric Baggage Truck.—A description and the service records of this truck in handling baggage and mail in two of the large stations in this country were given on page 586 of the issue of September 27.

Dust Laying on Railway Roadbeds.—The use of oil and other materials for keeping down the dust on railways was discussed editorially in the issue of October 4, page 615.

Aspects of Steam Railway Electrification.—Professor C. L. De Muralt described in the issue of October 4, page 623, the progress which has been made in the electrification of steam roads and discussed its practicability for further application.

The Seventh Street Viaduct at Des Moines, Iowa.—The details of the construction of this viaduct across the tracks of four railways were given in the issue of October 4, page 625. Interesting features of this work were the use of a steel structure which was encased in concrete for appearance, and the employment of the cement gun for covering much of the steel.

Influence of Grade Reduction on Cost of Operation on Wheeling & Lake Erie.—The annual report of former Receiver B. A. Worthington of the Wheeling & Lake Erie contained some very interesting figures on the economies resulting from systematic reduction of grades on that line. These figures are given on page 642 of the issue of October 4.

New 105 lb. Rail for New York Central Lines.—The new 105 lb. rail section and the angle bar to accompany it were shown in the issue of October 4, page 644.

Reconstruction of the Canadian Pacific Bridge Over the St. Lawrence.—In connection with the double tracking of the Canadian Pacific main line from Montreal to Farnham, it has been necessary to rebuild the bridge across the St. Lawrence for double track. The rebuilding of this bridge was described in the issue of October 11, page 676.

The Protection of Railway Embankments.—The various methods adopted for protecting embankments from standing or flowing water were described by A. M. Van Auken in the issue of October 11, page 680.

Comparison of Chemical Constituents of Steel Rails from 1870 to Date.—In view of the extended controversy regarding the chemical composition of rails, the comparison of specifications from 1870 to date by Paul M. La Bach, page 684 of the issue of October 11, is of timely interest.

\*Received in the contest on The Section Foreman Problem, which closed March 25, 1912.

## THE POLE AND SLAV AS TRACK LABORERS.\*

The Fifth of a Series of Discussions of the Characteristics of the Various Types of Maintenance Workmen.

### THE SLAV AS A TRACK LABORER.

By W. E. DAVIN,

Supervisor, Pittsburgh & Lake Erie, McKees Rocks, Pa.

On the eastern and middle western railways Slavs are employed as track laborers in numbers. With proper supervision they have been found capable of performing the duties of laborer, lampman, trackwalker, watchman, assistant foreman and foreman of construction gangs.

In common with all foreigners, when the Slavs first begin to work on the railways they are unable to speak or understand the English language, and as they have had no experience in handling track tools, the foreman has a difficult task to get them to understand what is wanted. It is necessary for him to select one or more of the more intelligent of the gang and teach them the more common terms that must be used in connection with the daily work.

At present we have several men in each gang who can speak and understand English fairly well. The foreman depends on them to educate the green men and teach them how to work with track tools. Inexperienced men will give good results if mixed with the more experienced men of the same nationality. Slavs and Hungarians or Italians and Slavs will not work together satisfactorily, and the risk of injury when handling rails, ties or heavy track material is increased if the nationalities are mixed.

The Slav is a robust man, capable of enduring the hardships that track laborers must stand. In case of emergencies, such as wrecks or washouts, where the tracks are blocked, these Slavs can be relied on to respond promptly and will remain on duty without rest for long periods when the emergency requires. They eat good, substantial food and clothe themselves comfortably for the work. They keep their living quarters clean and sanitary, differing in this respect from the Italians.

When employed in districts where dwelling houses cannot be procured, the Slavs are contented to live in camps, although they prefer to stay in boarding houses and are more contented when they can get their cooking done by the wife or other member of the family of the boarding boss. Unless the foreman and supervisor exercise strict discipline over them when living in large numbers in one place, they will lay off after pay days and holidays and frequently after a Sunday of drink and dissipation. In this respect they differ from the Italian who is more steady and reliable, seldom losing any time on account of drink.

In order to get results from this class of laborers a foreman must give his instructions as clearly and simply as possible, always illustrating his instructions in a practical way by taking the tools in his own hands and showing the men how to use them. The foreman who has a gang of foreigners engaged on track repairs is working under difficulties and disadvantages, and to get a fair day's work out of this class of labor it is necessary that he be practical in his work, as verbal instructions are not readily understood by these men.

The principal disadvantage with the Slav or foreigners in general as track laborers in comparison with the English-speaking or native laborers is that it takes careful training to make them understand and speak the English language well enough to make satisfactory trackmen out of them. The advantages of the Slav, Hungarian and other European laborers in comparison with the American laborers on track work are that they are more steady and can be relied on to perform in the best way they

know how the most unattractive kinds of work under most severe conditions and weather.

For work train work the Slavs are considered very satisfactory laborers. They work more at ease and give the best results when handling materials, and loading, unloading and handling rails and ties. For extra gangs used in laying rail, ballasting and making tie renewals they make very good men. For section gangs they are not as good as the Italian. It is very difficult to get them to work satisfactorily in small gangs.

Where a large number of gangs of different nationalities are employed, the best results can be secured by keeping the gangs of each nationality in separate groups. Where the work will permit, a rivalry between the gangs will result in a large increase in the amount of work. The Slav takes pride in outclassing other nationalities. In going about his work the Slav is somewhat slow and cautious. He does very little talking and shows no disposition to shirk. He is not quarrelsome and shows great respect for the foreman and officers.

The foreman must exercise strict discipline over this class of foreign laborers and avoid familiarity with them. He should not drive them except when necessary. Continual driving soon gets to be a habit, and when practiced unnecessarily Slavs take it as a matter of daily routine and when an emergency arises, requiring an extra effort they will be found wanting.

The Slav will learn in a short time to do track work and to understand the English language in so far as it concerns track work when given some attention by the foreman or sub-foreman. Interpreters and labor agents who insist on furnishing a foreman with each gang are to be tabooed. I consider the Slav well adapted to track work. The results obtained from this class depend largely on the ability and experience of the foreman in handling his men.

### CHARACTERISTICS OF THE SLAVISH TRACK LABORER.

By T. C. CREA,

Supervisor, Bessemer & Lake Erie, Greenville, Pa.

To secure good results from Slav laborers they must be worked in large gangs which are housed either in camp cars or in shanties located near a good supply of water. They must also be where they can have a daily supply of fresh meat, as this is their principal article of food. They eat about 1½ lbs. of meat per day per man, and are also very fond of dried peas and noodles. The Slav is unlike the Italian in that he does not want to do his own cooking. Each gang has a boarding boss or cook who buys all the supplies, does the washing and is paid at the end of the month for all supplies purchased plus a certain amount per man per day for his labor. From this it is seen that either a cook car or a cook shanty is necessary where a Slav gang is to be worked.

On account of his manner of living the Slav is a stronger man than the Italian and is superior to the Italian on construction work and in handling rails and renewing ties, but he is inferior to the Italian on general maintenance, as he is not as quick to pick up the different kinds of work. The Slav, like the Italian, has a great number of holidays, and it is with difficulty that he can be made to work on these days. However, after he has been in this country for a while, he gradually gets away from some of his home customs. Another very serious drawback with the Slav is his love for liquor, and it is very seldom possible to have a full gang after pay day.

The foreman in charge of a Slav gang must have had experience in handling foreign laborers in order to be successful, as these men are very quick to take offense when they do not understand what a foreman says. He should have a good trusty

\* Three articles in the *Railway Age Gazette* of June 21, page 1568, discussed "The Hobo as a Track Laborer"; four in the issue of July 19, 1912, page 121, discussed "The Negro as a Track Laborer"; four in the issue of August 16, page 303, discussed "The Italian as a Track Laborer," and four in the issue of September 20, page 527, discussed "The Mexican as a Track Laborer."

Slav assistant foreman who should be selected more for his ability to handle men than for his ability as a track man. However, if the two can be combined, it is of course a great advantage.

The Slav is more hardy than the Italian, being able to withstand much more cold weather, and he is not as liable to lay off during the winter months. When not working he is of a sociable disposition, is very fond of card games and is somewhat of a gambler, so that he is not as a general rule of a saving disposition. Another drawback of Slav laborers is their tendency to move about, sticking at one job but a short time, and then going to some other place, perhaps at the same kind of work on the same road. They will often change back and forth two or three times within a year, if allowed to do so. The cause of this is often a petty quarrel started while they are drinking. They do not make good foremen inasmuch as they are not original, never knowing how to go about a piece of work until they have done it several times, when it then becomes so fixed in their minds that it is almost impossible to change the method. Taking everything into consideration, I do not believe that the Slav is as good a trackman as the Italian.

#### ADVANTAGES OF THE POLE AS A TRACK LABORER.

By T. J. BURKE,

Division Engineer, Lehigh Valley, Auburn, N. Y.

The Pole is, in my estimation, the best type of track laborer that can be secured with prevailing rates of pay, and as long as such labor can be secured there is no economy in increasing the rates of pay in order to attract other classes. Poles are not, however, found to any extent outside of certain limited districts, although they can be persuaded to move into other parts of the country by offering proper inducements.

Where the Poles are at present available in the large eastern terminals, many Italians are also found, and in direct competition I have found the Poles much more efficient than the Italians. They are physically stronger and hardier, which fact alone gives them a big advantage for terminal work. Frequently problems are encountered here requiring sheer physical strength and endurance, and in this respect the Pole will more than fulfill any supervisor's expectations. On one occasion when important track changes were being made in the Erie terminals at Jersey City, the main tracks were broken in 23 places at one o'clock in the morning. Approximately one-third of the laborers at this time were Poles and the remaining two-thirds Italians. A steady cold rain started soon after the tracks were cut and continued for several hours. Under such conditions the poorest of the Italians quit the work before they had fairly gotten wet, and the best of them could not stand up under the work after their clothing had become thoroughly soaked. The Poles, however, stayed and finished the work in time to prevent any serious delay to traffic.

This illustrates the faithfulness to duty and reliance displayed by the Poles, for without this faithfulness their endurance could not be so well tested. The same thing is true with reference to their willingness to work continuously day after day. They dislike Sunday work and much prefer overtime on week days. However, I have seen them work 12 weeks during the hot summer weather without a day's rest.

One interesting part of a Pole's makeup which can be used to good advantage by a foreman is his desire to know the reasons for doing any particular piece of work. It makes no difference whether he is instructed to tamp the tie under the receiving end of a rail at a joint first, or to install a new switch or crossover, he wants to know the reason for it, and if he is told he will do the work better and quicker. For this same reason he takes more interest in his work when he feels that he is actually accomplishing something. Because of this, a poor foreman does not appeal to him, even though he may have an easy time working for him. A good Pole foreman can organize his fellow countrymen along semi-military lines and get a remarkable amount of work out of them.

In marked contrast with the Italians, the Poles do not congregate in groups to converse while at work. On the contrary, they scatter out and work alone or in two and threes. In congested territory they keep a foreman and his assistants very busy preventing them from being injured by trains. When one of their number is injured in any way they take it as a matter of course and create no disturbance, in marked contrast to some other classes of laborers. The Poles live comparatively well and do not deny themselves food or proper clothing in order to save money. They do, however, spend a large amount of money for beer, and nearly all of them are cigarette smokers. They will not live in bunk cars, but want good Polish boarding houses. Each man with a family will keep from six to eight boarders, but it is almost impossible to induce him to board any larger number. In this way they live cleanly and comfortably. They spend their evenings in a social way, card playing being their principal form of amusement. They have a great fear of the law and as a rule give little trouble in this regard. They are good tenants and give rise to very few complaints.

One disadvantage of working Poles is that they furnish no material from which to select foremen who can read and write English. Although many of them develop into first class track men and organizers, I have never found one who can pass the necessary examinations to become a regular foreman. Around terminals where there is plenty of supervision, this deficiency is not as serious as out on the line.

It is a difficult problem to induce the Poles to leave the terminals and establish themselves in rural communities. This can only be done by colonizing them in groups of 12 or more in one town and by assuring them steady employment throughout the year. The first condition can only be met by providing good houses for them to live in. In many cases it will pay the railway company to build a couple of houses where men are wanted. Of course the minimum number of men that can be induced to remain in one place requires that they be worked over a distance of perhaps 15 miles. This condition, however, can be met by the use of motor cars. It is not difficult to get them to work in gangs of this size, and they are not particular who boards them as long as the house and food are satisfactory.

The question of steady employment is the difficult one at the present time. Until the time comes when the railways shall rearrange their maintenance work to carry a more uniform working force throughout the year, the best thing that can be done to hold the Poles is to retain the boarding boss and as many boarders as are allowed by the appropriation, sending the remaining men back to the city. Then in the spring the boarding boss will see it to his interest to bring men out from the city to fill up the forces during the summer months.

#### THE POLISH TRACK LABORER.

By F. E. CRABBS,

Roadmaster, Chicago & North Western, Chicago.

I consider the Poles the best foreign workmen on the tracks today. As a rule they are naturally adapted to this kind of work, and they are really progressive. They are a class of people who like the best of everything, and as they are better fed than the average foreigner they are able to stand a hard day's work. They are very intelligent and, under the supervision of a good foreman, do their work more thoroughly than other foreign laborers.

They are unusually quick to recognize the authority of their superiors and, with their intelligence, they fully appreciate a little praise from the roadmaster, which should be given any class of laborers occasionally when they do their work well.

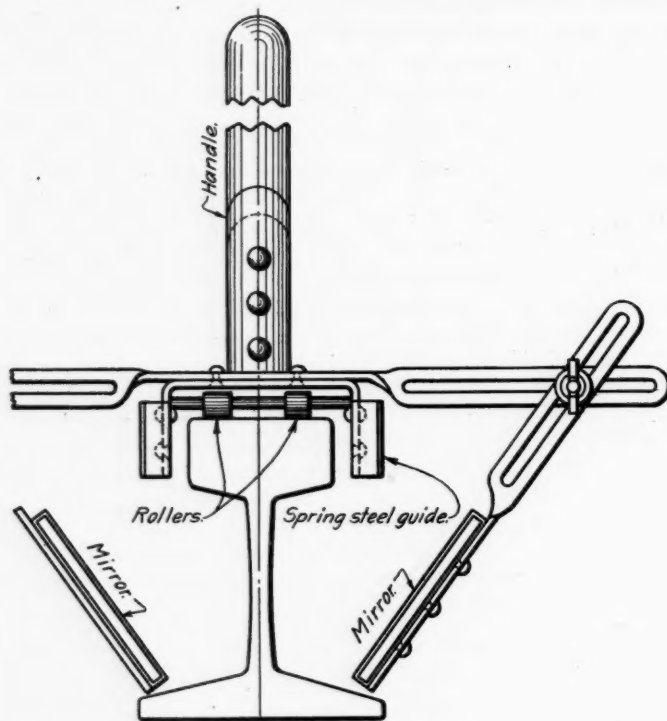
In emergencies, regardless of what the work may be or how dirty it is, they seldom shirk, but go at it with a determination to do whatever needs to be done or whatever they are told to do. In my experience with them I have never heard one complain of the work before him. During snow storms and around interlocking plants one Pole is worth three of any other class of for-

eign laborers, and his endurance for long hours is wonderful. When called day or night they are exceptionally prompt to get out, and are always at home when called. They are not a dissatisfied class of people and like to stay in one place as much as possible.

When the question of wages comes up they are very reasonable. They will not stop the work and leave the foreman with the track torn up, but will give him ample time to get an increase for them if possible. If impossible to get the increase they are intelligent enough to see that the roadmaster has done all he can for them, and then they resume their work. The Poles are the best foreign foremen you can get at present if they are started right. They have no other interests than that of looking after their work. They are a very agreeable class of foremen to get along with and are more capable of keeping their gangs filled than the average foreman.

### A DEVICE FOR INSPECTING RAILS.

With the increasing amount of attention paid to the careful inspection of rails to detect flaws as soon as they develop, the need of some apparatus to enable the inspection of the under side of the head to be made conveniently becomes more apparent. It is comparatively easy for the track men to inspect the top of the head and the flanges of the rail, but not so easy to inspect the upper portion of the web and the lower side of the head. The device shown herewith was designed to en-



Device for Inspecting Rails with Adjustable Mirror.

able the inspection of those parts of the rail most difficult of access to be made more conveniently.

This apparatus consists of two mirrors inclined at such an angle that the reflection of the under side of the head of the rail can be seen readily by a person standing erect over the rail. The mirrors are held in position by arms connected to a steel frame supported on the head of the rail by two  $\frac{1}{2}$ -in. wheels so that the device can be easily moved along the track. Small pieces of spring steel are riveted to this frame and fit loosely over the sides of the rail to hold the apparatus in place on the rail. This device is made either with the mirrors held rigidly in position by the two arms or by means of set screws providing for the adjustment of the mirrors for different

weights of rails, as shown in the accompanying drawing. The apparatus is provided with a handle 3 ft. long to enable it to be pushed over the track readily.

With this device, inspection of the rails can be made more conveniently, and at the same time much more rapidly than by the old methods. This device was designed and patented by J. S. Tyler, Grand Rapids, Mich., and is standard on one of the prominent railways, while its adoption is being considered on other roads.

### THE DEVELOPMENT AND STATUS OF THE WOOD PRESERVING INDUSTRY IN AMERICA.\*

By E. A. STERLING,†

Forest and Timber Engineer.

The literature on the subject of wood preservation in America is voluminous, but so fragmentary that a summarized review of the developments and present status of the industry is perhaps justified because of the importance of the question to scientific and commercial interests.

The first recorded use of treated ties is that of kyanized chestnut laid in the tracks of the Northern Central in Maryland in 1838, which were still sound when examined 11 years later. Kyanized oak ties, laid in the tracks of the Chesapeake & Ohio in 1840, were sound when examined 14 years later.

The first treating plant, worthy of the name, was probably that built at Lowell, Mass., in 1848, by the proprietors of the locks and canals at that point. The plant consisted of two wooden tanks, each 50 ft. long, eight ft. wide and four ft. deep, in which the lumber was immersed in accordance with the kyanizing process using bichloride of mercury. Prior to 1895, several temporary plants were constructed by railway companies, among those being one established by the Central Vermont in 1856; another by the Erie in 1861, at Owego, N. Y.; another by the Union Pacific in 1867, at Omaha, and one by the Philadelphia, Wilmington & Baltimore in 1863, all of these being for the use of zinc chloride by the burnettizing process. The first permanent railway plants were built in 1875 and 1876, one being constructed by the Louisville & Nashville at West Pascagoula, Miss., which is still in operation, and the other by the Houston and Texas Central. Both were creosoting plants.

In spite of the many attempts at wood preservations during the past 40 years, the rapid and permanent developments have mostly occurred during the past ten years. In 1900, there were 11 plants in operation, while at the beginning of 1912 there were about 100, with several more under construction or authorized. Prior to the year 1900 the most definite developments were in the West where scarcity of timber forced the railways to adopt measures by which longer life could be given their cross ties. We thus find that the Southern Pacific has a burnettizing plant which has been in operation since 1867, while a plant using the same process was put into service by the Santa Fe in 1885. The latter road has since adopted the Reuping creosoting process. Several commercial plants were also built in the western part of the United States prior to 1900, but the general adoption of preservative treatment throughout the United States, particularly by the eastern roads, has all been during the last ten years.

In Canada the developments have been even slower than in the United States, and it is only within the past two or three years that treating plants of any size have been put into operation. At present the Canadian Pacific and the Canadian Northern either use treated ties from plants already in operation, or have arranged for the construction of plants. In Mexico and South America little or nothing has been done, although some of the Mexican roads have experimented extensively with crude

\* Presented at the Eighth International Congress of Applied Chemistry, held in New York and Washington, September, 1912.

† Mr. Sterling is president of the American Wood Preservers' Association.

oil and several plants have been built. In South American countries there are no plants, as far as the writer's knowledge goes, but large quantities of creosoted material have been shipped from plants in the United States for use, particularly in marine work.

At the beginning of the year 1912, 101 plants were listed by the American Wood Preservers' Association. Of this number, 25 are owned and operated by railway companies, and 12 in addition are maintained solely for railway work. The remainder do a general commercial business. The industry in the United States, up to the present time, has been built up largely on railway cross ties, yet out of the 148,000,000 ties used in 1910, according to census figures, only 26,000,000 or about 18 per cent. received preservative treatment. This, however, is an increase of 275 per cent. over the number treated in 1905. During the year 1910, there were also treated approximately 133,000,000 board feet of lumber, which represents only 0.33 per cent. of the total consumption. The total output of all treated material in 1910 amounted to slightly over 100,000,000 cu. ft., which was 500 per cent. more than was treated in 1904. To treat this amount of material in 1910 there were consumed approximately 17,000,000 pounds of zinc chloride and 63,000,000 gallons of creosote, 71 per cent. of which was imported.

In 1911, according to statistics compiled by the American Wood Preservers' Association, a total of 110,372,660 cu. ft. of material was treated in the United States, this being an increase of 10 per cent. over the previous year and a 62 per cent. increase over 1907. Of this amount, 84,672,370 cu. ft. consisted of cross ties, 3,910,740 cu. ft. of piling, 1,085,971 ft. of poles, 10,140,474 cu. ft. of paving blocks, 6,831,416 cu. ft. of construction timber and 2,568,857 cu. ft. of lumber and miscellaneous material. By kinds of treatment 73,558,621 cu. ft. were treated with creosote, 29,501,665 cu. ft. with zinc chloride and 7,312,374 ft. with zinc chloride and creosote.

The kind and character of the timber treated varies greatly in different sections of the country. In the northeastern states the bulk of the material is hardwood, including red oak, beech, birch, maple and pine, which is shipped in by water from south Atlantic states. In the Lake states and the upper Mississippi valley the cross ties treated are almost exclusively hardwood of the species above named. In the south Atlantic and Gulf states, and to some extent in the Southwest, pine is used almost exclusively; while in the lower Mississippi valley and adjacent territory both black and red gum are being treated with apparent success. In the West and Northwest the wood most largely used for treatment is red fir. Considerable difference of opinion exists as to whether the so-called sap pine is suitable for cross ties. It is used extensively by some of the railways in the South and Southwest, where traffic is comparatively light, but the experience of the railways in the northeastern states, where traffic is heavier, indicates that the soft sap pine does not hold the spikes well and is not sufficiently resistant to rail cutting.

At the present time only two standard preservatives are in general use in the United States, namely, creosote and zinc chloride. Of these creosote seems to be gaining ground steadily, while zinc chloride is used mainly in the semi-arid regions of the Middle West or in combination with creosote. It should be mentioned that the Santa Fe is making very extensive experiments with a crude oil which carries a high percentage of asphaltum. While possessing no toxic properties this oil seems to effectively close the pores of the wood and act as an inert filler against the entrance of air, moisture and fungus spores. In later experiments a mixture of natural asphaltic oil and creosote has been used. In addition to the accepted preservatives named, many manufactured preservative compounds are on the market. Most of these are intended only for superficial application with a brush or in open tanks. Although the number of accepted preservatives has been reduced to two or three, several different and distinct processes for introducing the solutions

into the wood are in general use. Each of these has its ardent advocates and each has points of merit which can hardly be disputed. The following table summarizes the processes now used in America. The high pressure processes are most generally used, and while the so-called open tank or atmospheric pressure and the low pressure treatments have been used quite extensively by small concerns which could not afford expensive plants, it may be expected that the pressure treatment will prevail almost universally within a short time.

High artificial pressure processes .....	Full cell....	{ Bethell—creosote. Burnett—zinc chloride. Wellhouse—zinc chloride, glue and tannin. Card—zinc chloride and creosote. *Crude oil—natural asphaltic oil. *B. & M.—zinc chloride and aluminum salts.
	Empty cell.	{ Reuping—creosote. Lowry—creosote.
Atmospheric pressure processes .....	Full cell....	{ Soaking in cold preservatives. Soaking in hot preservatives. Alternate hot and cold treatments.
	Empty cell.	{ Hot, cold and hot treatments. Hot and graded cooling treatment.
Low artificial pressure processes .....	Full cell.	
	Empty cell.	

\* May be considered as still in the experimental stage.

In addition to the above kyanizing and vulcanizing plants are still operating in New England, the latter being a rapid drying or baking process without the use of a solution.

The question of specifications and standards and many important technical points requiring consideration do not come within the province of this paper. Zinc chloride, being a mineral salt, can be manufactured to meet definite specifications. Since crude oil is a natural product it is necessary to procure the supply from oil wells which produce the quality desired, namely, that with a very high percentage of asphaltum. The oil which has been found most suitable for preservative treatment is that known as Bakersfield oil from southern California, also from certain districts in Mexico.

In the matter of creosote specifications much more difficulty is encountered. Coal tar and creosote being a by-product of a by-product, and not manufactured exclusively for preservative purposes, varies greatly in its chemical composition and except by re-distillation cannot be made up to meet too strict specifications. The consumers have rather definite ideas as to the quality of creosote desired, but unfortunately it has been necessary to base the specifications on the kind of oil available, both abroad and in this country, rather than to make arbitrary standards and expect the manufacturer to meet them.

Several additional problems relating to the use of creosote as a preservative are pressing for solution. These include the advisability of using various mixtures of creosote and other products such as filtered tar, water gas oil, or the combining of creosotes of different grades; the use of water gas creosote either alone or in combination with pure coal tar creosote; the value and possible use of oil from coke over tar; and the combined use of creosote and crude oil.

The mechanical equipment of the modern American plant leaves little to be desired. High pressure cylinders six or seven ft. in diameter and up to 150 ft. long are practically the standard. Labor-saving devices are in much more general use than in Europe, and hand work is reduced to a minimum. One of the important recent improvements is an arrangement whereby the measuring and working tanks are mounted on scales, so that the amount of creosote or other solution absorbed is measured closely by actual weight rather than by volumetric scale readings. Automatic devices for unloading full tram carloads and machines which adze, bore, saw to even length and stamp with the date ties before treatment, are included among the mechanical developments.

The present tendencies are toward lighter impregnation with creosote, except in construction timber, or the use of mixture

which reduces the initial cost. No less than 16 of the plants listed by the American Wood Preservers' Association use a light impregnation creosote process and probably as many more use it on at least one part of their material, while several more plants use zinc chloride and creosote in mixture. This means that a large percentage of the treated cross ties used by the railways have less than six pounds of oil per cubic foot. Actually they have more than six pounds in the treatable or sap portion of the ties because the absorption is figured on the gross cubic contents. It may be argued that these light treatments are poor economy in the long run, and it is indisputable that they have not had the test of time. It must be remembered, however, that wear under the rail is responsible for a large percentage of tie failures after five years and that full impregnation would certainly not be justified without large and expensive tie plates and screw spikes. Recent developments in the adzing and boring of ties before treatment promises a solution of the question of mechanical wear in relation to impregnation and decay.

Apart from the many details which are in a fair way of being worked out, there are two very broad problems which confront the wood preservers of America, and to which they should give their attention if the industry is to remain permanent and profitable. One of these is the source of supply for creosote oil, the present indications being that a shortage is imminent and that high prices will prevail. While the consumers can perhaps do little of themselves to stimulate production, they can at least co-operate with the manufacturers and encourage the construction of by-product ovens in America, and maintain trade relations which will guarantee to the European distillers a definite market for their available creosote. Enough creosote is burned in the bee hive coke ovens of the United States every year to supply all reasonable demands for years to come.

The other problem is that of timber supply and it is one to which the wood preservers have paid too little attention. This applies to the owners of commercial plants, and particularly to the large railway companies which either operate their own treating plants or have their work done by contract. At the present rate of increase, the cost of treatable cross ties and other material will, in a very short time, be equal to that of white oak and other more durable woods. There are still enormous supplies of cheap woods available, and it is for this very reason that steps should be taken to perpetuate the supply. In some regions, however, the supply of treatable timber is already becoming depleted, and many plants will have to seek new locations or have their material shipped long distances within the next ten or twenty years.

Most of the hardwood timber, suitable for treatment, is of such slow growth that under present conditions it would not be profitable to reproduce it under any system of forest arrangement. In the South, on the other hand, are several fast-growing trees which would respond very readily to a system of conservative management. In the loblolly pine belts, for example, the output of timber from a definite area could easily be made permanent. It is estimated that about 100,000 acres of well-stocked loblolly pine land would produce 1,000,000 ties per annum for all time. It would have been very easy at the time some of the first railway plants were built to have acquired timber lands at comparatively low cost and by proper management made them a permanent source of cross tie supply. This has not been done.

**MINIATURE RATE WAR IN EUROPE.**—The Austrian and the German state railways have been having a little railway war, affecting chiefly transit freight—that is, goods shipped from one country and passing through the other country on its way to a third country. An old agreement had expired before the authorities could determine what the terms of a new one should be, and special rates were made with Swiss and French lines to bring each other to terms. Now all these war measures are to cease, and peace and harmony will reign.

## PENNSYLVANIA TRACK INSPECTION.

The general manager's annual track inspection on the main line of the Pennsylvania between Pittsburgh and New York, and between Philadelphia and Washington, was made on October 3 and 4. It was conducted by General Manager S. C. Long and four hundred engineering and operating officers traveling on six special trains. The inspection party left Pittsburgh on the morning of October 3, arriving at Harrisburg that evening and continuing to New York the next day.

While the awarding of the premiums is made at the time of the general manager's inspection, it is based upon the result of inspections made at intervals of about six weeks throughout the year by a committee consisting of the chief engineer of maintenance of way, the engineer of maintenance of way and three branch line superintendents. These inspections are made in a special car attached to one of the regular fast trains and there are careful observations by means of special instruments which indicate bad line and surface.

An instrument is used which records the irregularities in alinement by horizontal oscillation and irregularities in surface by vertical oscillation. Another instrument is used for registering the "water spills," which consists of a wooden framework holding in place a funnel, the point of which is placed in a small graduated glass, held in place by clasps. A thin tumbler kept continuously filled with water stands in the middle of the funnel. This device is placed on one or both window sills at the rear of the car. The quantity of water spilled from the tumbler through the funnel into the graduated glass is closely observed, and the accumulated readings of the quantity of water spilled into the graduated glass constitute what is called the "water spills." These "water spills" taken in conjunction with the readings of the track testing instrument form the basis of comparison between the different supervisor's divisions. The personal observations of the members of the track inspection committee also enter to a large extent into the final results.

The awards for the entire district were made immediately after the arrival of the inspection party at Harrisburg the first evening. The first prize of \$1,200, \$800 of which goes to the supervisor and \$400 to the assistant supervisor having the best line and surface of the entire line inspected, was awarded to C. M. Wisman, supervisor, and William F. Miller, assistant supervisor, in charge of track between Tulleytown, Pa., and Deans, N. J.

Four premiums of \$800 each, \$600 for the supervisor and \$200 for the assistant supervisor for the best line and surface on main line superintendent's divisions between New York and Pittsburgh and Philadelphia and Washington were awarded as follows: John Schimmel, Jr., supervisor, and F. H. Bentley, assistant supervisor, in charge of track from Woodbine avenue, West Philadelphia to west of Coatesville; J. A. Burchenal, supervisor, and E. C. Silvius, assistant supervisor, in charge of track from just west of Anderson, Pa., to east of Thompsonstown; A. W. McCellan, supervisor, and M. J. Jones, assistant supervisor, in charge of track from west of Wilmerding to west of Donohoe, and George Goldie, Jr., supervisor, and N. D. Vernon, assistant supervisor, in charge of track between Sixty-second street, West Philadelphia and Wilmington, Del.

A special improvement premium of \$1,000, \$700 of which goes to the supervisor and \$300 to the assistant supervisor, for the greatest improvement made in line and surface on the main line between New York and Pittsburgh and Philadelphia and Washington, was awarded to Supervisor G. H. B. English and Assistant Supervisor H. J. Davall, who have charge of the track between Wilmington, Del., and Perryville, Md.

This inspection has been for many years an annual event on the Pennsylvania which is looked forward to with much interest, and for this reason has been found to stimulate an interest in the track work and to promote a healthy rivalry between the different divisions and sub-divisions. It also has the advantage of bringing the track to the highest condition at the time when

it is most needed, that is, when it is going into the winter at which period repair work must be suspended for several months. These annual inspections also afford an opportunity for the supervisors to become acquainted with one another and with their superiors in the maintenance of way and operating departments.

### THE SECTION FOREMAN PROBLEM.\*

By W. K. WALKER.

Division Engineer, Missouri Pacific, Wichita, Kan.

When roadmaster, I decided on a plan for providing section foremen which I thought was a good one, and as division engineer I have followed it up, and it has proved very satisfactory. I find that an increase in pay soon reaches the point where the railway is the loser. When an ordinary section foreman is receiving double the pay of two laborers, he begins to be a losing proposition. I never hire an outside foreman, that is, one who has worked on other divisions or roads. I let all of my men know that when there is a vacancy, there will be no outsider step in and take the position. The place is always filled by someone who is on a section. I am able to fill these positions in this way by having on each roadmaster's territory two or three young native men on important sections who are held there by giving them steady employment the year round and by promising them promotion when an opening may occur, providing they have had the necessary experience. These young men are not merely held as laborers until they can be promoted to the position of foremen, but during the summer time when there is a great deal of construction work, etc., going on, they are given positions on extra gangs as timekeepers or assistant foremen. After they have reached a certain degree of perfection in section work they are placed on yard sections as assistant foremen. They are required to work from one to three years before promotion to the position of foremen, and the other sections on the road know the men who are being trained. As fast as one of them is promoted, some other bright young man who is working for such a position is placed on the rolls for promotion.

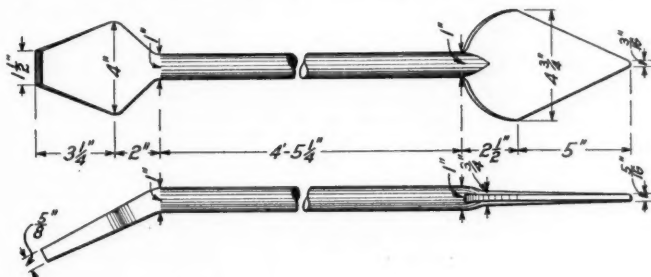
As division engineer, I have followed this plan for the past three and one-half years, and I have never had any trouble keeping a few energetic young men on the pay rolls whom I could pick up on short notice and place on a section as foremen. I have not had to hire any outsiders for foremen, neither have I ever had to put a foreigner in the position of foreman. Before this plan was put into effect, this division had considerable trouble keeping men on sections to promote.

### THE DIAMOND STONE TAMPING BAR.

As its name would indicate, the Diamond stone tamping bar is designed especially for tamping stone ballast—the special advantage of its design being the diamond shaped tamping head. The forward portion of this head is about  $1\frac{1}{2}$  in. wide and  $\frac{7}{8}$  in. thick, gradually increasing in width and thickness. The shape of the head permits the use of very high carbon steel with its greater wearing qualities and without the objection of the hardened steel chipping off as is frequently the case with square corners. The tapering thickness is to provide excess metal which can be drawn down to maintain the original shape of the bar when it is being repaired rather than to increase the width of the point.

Because of its peculiar shape, the bar is readily inserted beneath the tie and the force of the blow drives the ballast in three directions tending to compact it rather than to force it out at the other side of the tie; also ties may be tamped on both sides at the same time and the long handle permits a man to stand erect

while working. Its use has been found to result not only in a more compact and even riding track, but the cost of putting in stone ballast has also been materially reduced. On one road where 232 miles of track were ballasted by the use of the more common tools and 42 miles ballasted by the use of the Diamond stone tamping bar, it is stated that the average cost



The Diamond Stone Tamping Bar.

per yard for labor was \$.237 by the old method and \$.138 with the new. This bar was devised by G. H. Prentice, roadmaster of the Lake Shore & Michigan Southern, and has been used the past season on five or six of the eastern roads. It is manufactured by the Verona Tool Works, Pittsburgh, Pa. We are indebted to Mr. Prentice for much of the above information.

### USE OF PIECE WORK SYSTEM ON THE JAMAICA GOVERNMENT RAILWAY.

By FRANK RICHMOND,

Assistant to Director.

The only labor available for the maintenance of way, bridges and structures on the Jamaica Government Railway is negro. Track weeding is paid for at the rate of \$5 per mile for a width of 12 ft. For the most part this work is performed by women for whom, when working by the day, a day's wage is 25 cents. The weeds are dug out or loosened with a machete or cutlass which the laborer provides for himself. The track is weeded on the average, three times a year.

Rock ballast is of fairly hard limestone and is broken by hand along the track wherever required. The prices paid, depending on the conditions, are generally as follows:

Breaking (stone delivered on the spot).....	18-25 cents per cu. yd.
Gathering stone from right of way and breaking..	25-31 cents per cu. yd.
Quarrying stone with bars and breaking.....	31-36 cents per cu. yd.

All ballast is measured on the ground and is made up in heaps of regular width and depth in order to facilitate measurement. The laborers provide their own hammers for breaking the ballast.

The prices per cubic yard given below are paid for quarrying rock and breaking ballast at a place where a regular quarry is worked:

1. To drill, blast and quarry rock to cubes approximately not less than 18 in. or more than 36 in. in the rough..... 32 cents
2. To load rock specified under Item 1 onto American flat cars. 4 cents
3. To load rock specified under Item 1 into gondolas..... 8 cents
4. To load rock specified under Item 1 into freight cars..... 8 cents
5. To drill, blast and quarry and break rock to pass through a ring  $1\frac{3}{4}$  in. in diameter..... 42 cents
6. To load stone specified under Item 5 onto American flat cars. 6 cents
7. To load stone specified under Item 5 into gondolas..... 8 cents
8. To load stone specified under Item 5 into freight cars..... 10 cents
9. To drill, blast and quarry, sledge and stack suitably for measurement, rock approximately not less than 6 in. or more than 18 in. cubes in the rough..... 25 cents
10. To load rock specified under Item 9 onto American flat cars. 4 cents

The contractor in this case provides all labor and explosives, but is furnished with all tools necessary.

All masonry and concrete work except in large works is also done by piece work, a competent man being of course chosen. The unit prices given below are from an agreement made with an ordinary negro mason for building the substructure of a freight and passenger depot 135 ft. long by 33 ft. wide. The contractor furnished all labor and the railway all the materials and tools except what may be termed personal tools, such as

\*Received in the contest on The Section Foreman Problem, which closed March 25, 1912.

trowels, squares, spirit levels, hemp lines and plumbs. All materials and water were delivered on the site.

Description of work.	Approximate amount of work to be done.	Rate.
1. To excavate in earth approximately 12 in. deep and throw out spoil, per cu. yd.....	45	\$0.14
2. To mix and deposit 1:9 marl Portland cement concrete in footings without boxing, per cu. yd.....	45	.62
3. To put up boxing, mix and deposit 1:8 Portland cement marl concrete in walls 9 in. and 12 in. thick up to 4 ft. above ground level, per cu. yd.....	9	1.56
4. To put up boxing, mix and deposit 1:8 Portland cement marl concrete in courses 12 in. and 15 in. deep on walls 15 in. and 18 in. thick up to 4 ft. above ground and in steps, per cu. yd.....	20	1.56
5. To mix 1:4 Portland cement and sand mortar and build random rubble walls up to 3 ft. above ground, using limestone rock with one face of wall pointed and with joints in face of wall larger than 3/4 in., per cu. yd..	68	1.31
6. To build wall same as described in Item 5 without pointing, per cu. yd.....	..	1.12
7. To mix and deposit 1:8 Portland cement marl concrete and 1:2 Portland cement and sand mortar in floors. Concrete to be 3 in. thick and mortar 1 in. thick on top of concrete, per sq. yd.....	450	.31
8. To pack limestone rock 2 ft. thick behind completed walls up to 4 ft. above ground level, per cu. yd.....	95	.12

The following prices were paid for building a sea wall:

	Per Cu. Yd.
1. Excavation in sand, gravel, boulders and earth. To be thrown out 4 ft. clear of coffer-dam and to be kept 4 ft. clear of piling of coffer-dam at nearest point at all times.....	12 cents
2. Excavation in sand, gravel and rock below water level. To be thrown out 4 ft. clear of coffer-dam and at all times to be kept not less than 4 ft. from piling at nearest point....	36 cents
	Per Sq. Yd.
3. Putting down sheet piling 6 in. x 14 in. with walings 3 in. x 4 in. and braces 4 in. x 4 in.; braces to be not further apart than 4 ft. c. to c.....	18 cents
4. Drawing out sheet piling, walings and braces and stacking....	12 cents
	Per Cu. Yd.
5. Gathering sand and gravel and mixing and depositing 1:3:6 concrete below water .....	\$1.06
6. Building rubble wall faced both sides and laid in 1:4 mortar with 6 in. square weep holes 10 ft. c. to c.....	\$1.06
7. Gathering sand and gravel, erecting forms and mixing and depositing 1:4:8 concrete to form capping conforming to size of capping on existing wall.....	\$1.25
8. Excavation behind completed wall (for a width of 3 ft.) to allow of dry stone packing being put in.....	8 cents
9. Building up dry stone packing behind completed wall 2 ft. thick .....	18 cents
10. Filling behind completed wall with earth, sand and stone....	8 cents

The sand, gravel and water required were taken from the sea beach. All pumping required was carried out by the railway company's forces.

As an illustration of the extent to which piece work is used, the accompanying schedule of labor prices used in building a small house is given:

#### RATES PAID FOR BUILDING A HOUSE.

	Unit of Measurement.	Approximate quantity of work to be done.	Rate.
1. Hardwood, wrot., frame and fix.....	100 ft. B.M.	8	\$3.50
2. Hardwood rough, frame and fix.....	100 ft. B.M.	4	2.50
3. P. P. rough, framed and fixed.....	100 ft. B.M.	2.3	1.75
4. P. P. wrot., framed and fixed.....	100 ft. B.M.	8.6	2.50
5. Put on 1 in. x 8 in. clinker as siding.....	100 sq. ft.	10.8	.87
6. Lay 1/4 in. x 6 in. G. & T. flooring....	100 sq. ft.	2.6	.75
7. Put on 1 in. x 6 in. G. & T. for partitions .....	100 sq. ft.	6.8	.87
8. Lay cedar shingling.....	100 sq. ft.	8.3	1.25
9. Put on No. 24 B. W. G. galvanized corrugated sheets .....	100 sq. ft.	2 3/4	.62
10. Put up 1 in. x 6 in. weather boarding .....	lin. ft.	104 ft.	.02
11. Put up door, window and corner facings .....	lin. ft.	253 ft.	.02 1/2
12. Put up barge board.....	lin. ft.	68 ft.	.03
13. Hang 3 ft. 6 in. x 7 ft. 6 in. doors...	pair	1	.75
14. Fit and hang 3 ft. x 7 ft. doors.....	no	3	.62
15. Fit and hang window sash with weights, etc.....	sets	2	1.00
16. Fit and hang 2 ft. 6 in. x 7 ft. batten doors .....	no	2	.62
17. Fit and hang jalousie shutters.....	sets	5	.50
18. Make 2 ft. 6 in. x 4 ft. 6 in. shutters .....	sets	5	2.00
19. Dress and fix 1 in. x 6 in. capping....	lin. ft.	34 ft.	.04
20. Do plain combing.....	lin. ft.	19 ft.	.04
21. Galvanized ridge capping.....	lin. ft.	23 ft.	.01
22. Make 2 ft. 6 in. x 7 ft. batten doors.	no	2	.87
Extra. Make sham panel door.....	sq. ft.	21	.12

Most of the casual repairs to buildings are also done piece work where possible. The employment of carpenters by the day is very exceptional. The lumber, except in the case of flooring and clinker boarding which are dressed on one side, is delivered to the carpenter rough. All painting is done piece work, the unit being the square yard, and 1/2 cent to 2 cents per sq. yd. per coat being an average price for new work inclusive of the mixing of the paints.

For the erection of a light steel frame shed, 125 ft. x 50 ft. covered with No. 22 B. W. G. galvanized corrugated sheets, the following prices were paid:

1. Assembling and erecting steel framing in columns, roof trusses, purlins, side rails, etc., and bolting up; 15.2 long tons, per ton. \$10.00
2. Laying galvanized corrugated sheets No. 22 B. W. G. secured to angle iron purlins with hook bolts and with bolts in ends and sides of sheets for holding sheets to one another, per 100 sq. ft. \$1.00

All tools and materials were supplied to the contractor.

For curving 78-lb. rails 30 ft. long to a radius of 330 ft. with an ordinary rail bender 30 cents per rail is paid. For making hardwood plugs for plugging old spike holes in ties 6 cents per 100 is paid.

The track runs along the northern coast of Jamaica for 25 miles, and in many places in time of storm the spray from the sea falls on the rails, causing such excessive corrosion that the rails have to be kept painted in order to prolong their life. The paint used is composed of coal tar and Portland cement mixed in the proportion of 1 quart cement to 1 gal. (imperial) tar, and is applied boiling hot. The top of the head and underside of the flange of course cannot be coated. For scraping off old and applying new tar as above on 60-lb. rails 30 ft. long a price of 6 to 8 cents per rail is paid. This same tar and cement paint is used for bridgework, and has been found to give very satisfactory results. It is also used on steel undeframes and on trucks of freight cars.

Cleaning of old and cutting of new track and surface ditches is paid for by the 100 ft., the price depending on each case. All excavation for sidings, buildings, walls, etc., is paid for by the cubic yard.

Ordinary earth excavation by pick and shovel is paid for at 8 cents, and when moved by wheelbarrows 2 cents per 100 ft. is paid for such transport up to 400 ft.

The labor rates in American gold are generally as follows:

Track laborers, per day.....	\$0.36 to \$0.42
Track foremen, per week.....	7.50
Track section bosses, per day.....	.75
Masons, per day .....	.62 to \$1.00
Carpenters, per day .....	.75 to 1.25
Women, per day .....	.25

## THE MAINTENANCE OF TRACK AND SIGNALS.

At the annual meeting of the operating officers of the Illinois Central, which was held in Chicago, October 7 and 8, several papers were presented of special interest to maintenance of way men. Abstracts of three of these papers are given below.

#### MAINTENANCE OF TRACK AND STRUCTURES.

During the next month officers in charge of maintenance should go over their track carefully, inspecting in detail the conditions that exist, and making a record of the work that should be done on each mile during the following year and an estimate for all the material and labor necessary. When this inspection record is completed the roadmaster should see that each supervisor and foreman is furnished with a detailed statement of the work expected of him the following season, and the roadmaster and superintendent should frequently check the schedule of work during the year to see that the programme is followed. At the end of the following working season the previous record of conditions should be checked against the record then made to see what actual good has been accomplished during the year.

When the working season begins in the spring all ties for the year's work should have been received and carefully piled to be distributed as they are used; all new rail that is to be used during the year distributed excepting in yards and through stations, where it should be piled and distributed as needed, sufficient bridge, signal, building and waterworks material to be assembled to commence the year's work.

Early in the spring the first thing to be done is to smooth the track, taking out irregularities in line and surface, driving down all spikes, tightening all bolts, removing all shims, etc. After this is done the season's work should be begun, and it is,

of course, preferable to get the new rail laid, new ties applied, banks strengthened, ditches cleaned and new ballast applied as soon and as rapidly as possible so as to allow the track to properly settle before the following winter, having in mind always that safe, good riding track must be maintained at all times, and that nothing else in the maintenance of track is so important as this.

As a general proposition, excepting where new rail is to be laid, or on certain kinds of ballast such as cementing gravel, a portion of each section should be overhauled each year, making a slight raise of from one to two inches where sufficient ballast is under the track, putting in all necessary ties, gaging track, driving down all spikes, tightening all bolts uniformly, applying all ballast and dressing it neatly in accordance with standards to provide proper drainage and a neat appearance, strengthening banks and widening cuts where necessary, cutting sod lines, etc. Where new rail is laid and where cementing gravel is used this work is necessary over the whole territory covered.

As "cleanliness is next to Godliness" in daily life, so is cleanliness or neatness next to safety in railway maintenance, and I venture to say that few have ever seen a road that had clean ballast, a neatly dressed sod line, clean right of way, clean stations and station grounds, and straight sign posts, that did not have track in good line and surface. I have frequently noticed on railways that have rough track, fences in bad repair, right of way untidy and structures in a dilapidated state, that the other operating features are also lax; but when the condition of the track and structures improves, the other operating features also have a tendency to improve, and everyone connected with the operation of the railway, from the section laborer up, takes more pride in his work.

This report was prepared by L. W. Baldwin, engineer of maintenance of way; T. E. Hill, division superintendent; E. J. Boland, assistant roadmaster, and P. Laden.

#### MAINTENANCE OF AUTOMATIC SIGNALS BY TRACK FOREMEN.

The maintenance of block signals by section foremen is a new departure on the Illinois Central, but it is proposed to try this system out on the Tennessee division in the near future. With the exception of about 38 miles of single track the Tennessee division is equipped from Ballard Junction to Memphis, with Hall gas signals. With the present system the signals are in charge of a signal foreman, who reports to the signal engineer and the roadmaster. He has under him nine maintainers and eight battery men. Each maintainer has charge of the signals on about 15 miles of track and it is his duty to see that all signals are properly adjusted and in good working order. He generally gets over his territory every two or three days. The battery men are what might be termed apprentices. They keep up the batteries and light the signal lamps. They also spend a great deal of their time with the maintainer, and generally at the end of a three years' apprenticeship they are capable of performing the duties of a maintainer.

The proposed section gang organization for the handling of block signals contemplates an increase of \$5 per month in the salary of the foreman and the appointing of an assistant foreman. The foreman will look after the signals, and while he is doing this an assistant foreman will have charge of the gang. The assistant foreman also takes up the duties of the track walker and lights the signal and switch lamps. When not engaged in these duties he will work in the gang along with the other men. This will enable us to abandon the present division signal organization and the present method of using a laborer for a track walker. Whether this will be a more efficient organization than under the present system remains to be seen.

Can the section foreman take care of these signals? They possess as much common sense and are as well educated as the average maintainer. As a rule they are ambitious and want something better. With but two or three exceptions the foremen in block signal territory, on the Tennessee division, are willing to try the new plan, but they say they do not care to take up this work until they have had sufficient knowledge of,

and practical experience with, the signals so they will not fail to make a success of it. This knowledge and experience cannot be gained in a day and it will take a considerable amount of time and instruction to properly equip these foremen with all the details of the whole system. Many of them are taking the block signal course, but are not making much progress because they are not getting practical experience with it. Foremen are continually changing about so that it would be necessary to have a number of assistant foremen who will be able to qualify and look after the signals, as well as to carry on the work of the section foremen. The principal thoughts we should most consider are these: First, can we sacrifice the experience of a good track foreman and have him look after the signals while the assistant foreman, a man of much less track experience, looks after the track work? Second, will the new organization be as efficient as and cheaper than the present one?

The report was prepared by M. B. Morgan, roadmaster; J. Clifford, roadmaster; A. F. Blaess, assistant engineer maintenance of way and N. E. Baker, signal engineer.

#### IMPROVEMENT IN THE MAINTENANCE AND OBSERVANCE OF SIGNALS.

The maintenance of signals means more to railway operation than any other feature of the maintenance of way department. Curtailing of expenses on the track means low joints and rough riding track, and on bridges it means more expenditures the following year; but in signals it may mean an accident, or more likely, delays to trains. The principal thing to follow up in maintenance of signals is the signal failures. All signal failures are avoidable. The cause may be faulty installation or a poor or inexperienced maintainer; or it may be from many causes all of which could have been avoided with proper care.

The section foreman in block signal territory is a very important person in the maintenance of the signals. Where he has been instructed properly by the signal maintainer and supervisor relative to the insulated joints, and then carries out such instructions, we seldom have a failure due to the track. Many supervisors do not feel that insulated joints should be overhauled at regular intervals. They look at the joint from the top and if it has a good end post they feel that it is perfect. It is very important to take the joint apart and apply new insulation as it not only prevents signal failures but assists in the riding condition of the track. Many section foremen who have not been properly instructed on insulated joint maintenance feel that the end post is all that is necessary to have a good joint and I have known them to put a tenpenny nail between the ends of the rail at the base to hold the rails apart and after cutting the base off a new fiber end post they would drive it down until it came flush with the ball, giving the impression that it was perfect and needed no additional attention.

This perhaps is one of the good arguments for the maintenance of signals by the section foreman and it has many advantages, for if the section foreman understands the workings of automatic signals he will appreciate the value of the work on his track. Many are of the opinion that the maintenance of signals is too complicated for a section foreman, but that may be due to lack of instruction. I recall that in 1896 there were only two foremen on the Chicago terminal who could put in a double split switch. Now I would venture to say that there is no foreman on the terminal who could not do this, as a result of instruction. If our section foremen in block signal territory would take the course offered by the Educational Bureau and apply themselves to the work it may be found that the work is not so complicated as it seems.

When signals fail for any cause they must not only be reported but properly investigated, and I would recommend that a blank similar to the engine failure report be used and numbered and a file started on each individual failure. If these are followed up and the person at fault dealt with as he should be or properly instructed, our failures will be reduced to a minimum.

This report was prepared by L. A. Downs, division superintendent; N. E. Baker, signal engineer; C. H. Hammond, trainmaster and W. E. Knox, trainmaster.

# BRIDGE AND BUILDING ASSOCIATION CONVENTION.

Abstracts of Reports and Discussions and List of Exhibits at  
the Twenty-second Annual Meeting This Week at Baltimore.

The twenty-second annual convention of the American Railway Bridge and Building Association met at the Hotel Emerson, Baltimore, Md., October 15-17. The interest manifested at the different sessions and the character of the committee reports indicated the steady progress which has been made during the past year under the direction of the following officers: President, F. E. Schall, Lehigh Valley; first vice-president, A. E. Killam, Intercolonial; second vice-president, J. N. Penwell, Lake Erie & Western; third vice-president, L. D. Hadwen, Chicago, Milwaukee & St. Paul; fourth vice-president, T. J. Fullem, Illinois Central; secretary, C. A. Lichty, Chicago & North Western; treasurer, J. P. Canty, Boston & Maine.

The convention was called to order by President Schall, who asked Vice-President Penwell to offer prayer. Robt. H. Lee, secretary to the mayor, welcomed the convention to the city.

The report of the treasurer showed a balance of over \$1,000, while over 50 new members were received during the year, making the total membership higher than at any time in the history of the association.

In his opening address, President Schall commented on the growth of the association from 60 charter members in 1891 to 171 in 1901 and to over 500 in 1912. He stated that an increased membership meant increased responsibilities for the association and urged the importance of consistent work in the committees. The acceptance of a committee appointment means an obligation to work and at the same time offers privileges for study and investigation. He also paid a tribute to the five members who died during the preceding year.

## FIREPROOFING TIMBER BRIDGES.

The work assigned to the committee consisted of making tests of different kinds of fire resisting paints when applied to timber bridges. Up to this time it has erected ten test structures at West Chicago, each 8 ft. long and about 4 ft. high. No paint has been applied to these yet, but this will be done the latter part of this month. The structures will then stand through the winter and the fire tests will be made in May or June, 1913. Inquiries have been made of 88 manufacturers of paints, as a result of which 18 sent fire resisting paint, manufactured by them, for the test.

Committee: Lee Jutton (C. & N. W.); W. H. Moore (N. Y. N. H. & H.); C. A. Marcy (C. & N. W.), and C. T. Musgrave (O. S. L.).

## DISCUSSION.

A. S. Markley (C. & E. I.) thought that one structure should be provided for each kind of paint and that the paint manufacturers should be allowed to apply the paint.

C. A. Lichty (C. & W.) thought that the paints should be applied by regular railway forces under conditions as nearly identical with actual service conditions as possible, following the manufacturers' standard instructions for such paints.

C. Ettinger (I. C.) also advocated making the tests under actual working conditions, allowing the manufacturers to have representatives watch the painting, but doing the work with company forces.

J. N. Penwell (L. E. & W.) believed that the paints should be purchased in the open market and that special samples should not be requested, for there is no guarantee that the regular paint will agree with the sample. No formulas are given for these paints, so there is no way to check them. He also suggested that ordinary white wash be given a trial.

Lee Jutton (C. & N. W.) stated that even if paint is purchased in the market, there is no way to know that the quality will be maintained, and favored accepting the manufacturers' samples.

The committee was instructed to purchase the fireproofing paints in the open market and to use its judgment as to the method of application.

## HANDLING MATERIAL IN SUPPLY YARDS.

From 46 roads replying to a circular letter asking for information on the subject, 15 roads report using no derricks of any description. Six roads report that the store department handles all material, shipping it directly to each piece of work. Seven use no derricks except the steam wrecking derricks which are employed for loading heavy material. Eight use steam derricks of various kinds which operate under their own power, and are made by several manufacturers. Six use derricks of various kinds built by their own forces. One uses an electric traveling crane. Two use common stationary derricks similar to the stone derrick with booms of sufficient length to reach one track on each side, and one uses an ordinary stiff-leg derrick for handling heavy material.

The use of derricks and other appliances for handling material is divided in two groups, one for supply yards and the other for work of various kinds out on the road. The subject assigned limited the investigation to the first group and the application of such devices outside of supply yards is not considered here, although it is difficult in many cases to draw a dividing line between the two and a more complete report could have been obtained had the committee been allowed to discuss the entire subject. In many cases it is difficult to draw a line between the use of a derrick for the two classes of work, for one type is frequently used intermittently for both kinds, and its adaptability for one may govern its selection, although it may possess certain disadvantages when applied to the other work. Bridge derricks can be used to good advantage in yards when not in service on the road, but as they are very often unavailable when required for yard work, they do not fill the requirements for this purpose.

The advantages of a derrick car and the kind most suited for any particular work depend primarily on the amount and kind of material to be handled. Where but a few cars of material are handled annually, it is not advisable to go to much expense to install the equipment unless the proportion of heavy material is large, in which case a stationary stiff-leg derrick may be advisable. However, as the amount of material becomes greater, the advantages of a derrick increase rapidly, and the committee is strongly of the opinion that derricks of some type can be used with economy in a large number of yards where they are not so used today.

A derrick with four or five men will handle as much material as three times that number of men without such assistance, and in less time. Labor is continually becoming more expensive and scarce; the proper equipment will not only reduce the number of men required but will lighten their work and enable the foremen to secure better men for the money spent. The use of less men in this work permits them to be employed in other gangs, in this way relieving to some extent the difficulties in securing men. Also, in handling heavy materials, the risk of injury to men is great and this risk will increase as the foreign labor becomes more generally employed in material yards.

Another important advantage of the use of derrick cars is the greater speed in unloading material. This is of advantage in releasing cars more promptly, which in itself is frequently an important item in times of car shortage as at the present time. The accumulation of demurrage charges is also to be avoided where much lumber, cement, iron pipe, etc., come in foreign cars. This time element is of special importance in loading large quantities of material which is frequently needed for

construction work, or in emergencies such as wash-outs and wrecks. In such times, every hour saved is very important and proper facilities and equipment for handling material will expedite work greatly.

The type of derrick to be used is largely one of individual choice and depends upon the kind of material to be handled. Where large quantities of material are handled, a traveling electric crane may be advisable. For yards of lesser importance, self-propelled steam derricks with booms of sufficient length to unload material from the car in advance of the derrick and on the same track, and to pile materials for some distance on either side, may be advisable. A self-propelling car possesses the advantage that it can spot cars where wanted and then unload the material without requiring the attention of a switch engine, the latter usually resulting in more or less delay. Where a yard is not of sufficient importance to justify the expense of the above equipment, home-made derricks constructed of material on hand are frequently advisable. Derricks similar to the stone derrick with booms 30 or 40 ft. long are recommended where much heavy material is to be handled.

Where station derricks are used, tramways should be built at right angles with the track to enable men to distribute lighter material out of reach of the derrick, leaving the space within reach for the storage of heavier material.

The committee has not been able to secure data relative to the cost of handling material, but from the letters received, it is estimated that the cost of handling heavy timber, iron and concrete pipe, etc., can be reduced 50 per cent. by the use of proper equipment. Lighter material can also be handled at a saving of from 10 to 25 per cent.

Committee: J. N. Penwell (L. E. & W.); A. S. Markley (C. & E. I.); A. Yappen (C. M. & St. P.); D. B. Taylor (B. & O.); E. A. Stanley (M. P.).

#### DISCUSSION.

A. S. Markley (C. & E. I.) uses a self-propelling pile driver with the leads removed. This car can move six cars on a level track. With it, the average cost of handling large quantities of material over a period of eight months was reduced to \$0.35 per thousand board feet, as compared with a cost of from \$2 to \$5 when handled by hand. Piling is handled for one-half cent per cu. ft. Two men, in addition to the engineer, can readily load material.

C. E. Smith (Mo. Pac.) stated that great economy can be shown by the use of a self-propelling locomotive crane with a boom 40 ft. to 50 ft. long and with a capacity of 12 to 15 tons.

J. M. Staten (C. & O.) said that on his road material was shipped directly to the point of use and was not assembled in one yard. Only second hand material and a small amount of emergency materials are kept in the supply yard.

G. W. Andrews (B. & O.) thought that the best method for handling material depended on local conditions and the amount of money the company will spend. In some places, skids are erected on the level of the car floor. Where stiff leg derricks are used, an extra track must be provided unless the derricks are placed on high platforms to enable cars to be filled. Gantry cranes are good in some places. A locomotive crane with a long boom is, however, the most valuable device in a large yard. It can be purchased for \$6,000 and the interest and repairs should not exceed \$600. It should be possible to show an economy in excess of this amount in large yards in addition to the ability to use this machine for a wide variety of other purposes.

#### CONCRETE TANKS.

In its 1911 report the committee reviewed the progress that had been made up to that time in the construction of concrete tanks and examples of tanks built for railway and other purposes were given. It is becoming quite usual at railway water stations to place the tank farther away from the tracks and deliver water to the engines through pipe lines and stand-pipes, thereby making the water tank a more permanent structure.

This practice reduces the need of a structure that can be moved on account of track changes and makes the concrete tank possible.

The two great arguments in favor of the concrete tank are permanence and minimum cost of maintenance. When the life of the tank is taken into consideration the latter will more than offset the increased cost of construction. The concrete tank is more costly than the wood or steel tank, but the steady increase in the price of lumber and the more improved methods of concrete construction are steadily reducing the difference.

The committee is of the opinion that when subjected to the severest winter weather the concrete tank will stand up better than tanks of other materials. The above statement is based on conversations with various engineers who have had experience in water supply, and at present cannot be substantiated by facts. However, some concrete tanks are located where they are subjected to severe freezing weather and others are being considered, therefore, it will not be long before this point can be determined definitely.

Many arguments are advanced against the concrete tank, the chief one being that poor workmanship will result in a defective tank and cannot readily be discovered or remedied. The statement is true, but it is also true of all other forms of construction. The remedy is careful, conscientious and competent supervision in selecting materials and doing the work.

There is no form of concrete construction in which the care and judgment used in the selection and application of the materials is of more importance than in tank construction. Only cement of approved brands from reliable manufacturers should be used. It should be delivered on the job in original packages and each consignment should be carefully tested. The sand, gravel and crushed stone must be carefully examined for impurities, and all such containing impurities must be rejected. The sizes of the various materials should be carefully considered and the proportions to be used determined in order that the resulting concrete will be as dense and watertight as possible.

There seems to be a wide difference of opinion regarding the kind of a mixture that will produce the most compact and impervious concrete. Most specifications call for a wet mixture, yet occasionally the dry mixture is specified. L. Heidenreich says in his *Engineer's Pocket-book of Reinforced Concrete*, "The author prefers for tanks a rather dry mixture of one part cement to four parts coarse sand well tamped. If a wet mixture is used the mortar or concrete is apt to contract in setting, thereby causing initial compressive stresses in the steel reinforcement. When the tank is filled the concrete will crack in various places until the steel receives its tension stress. This is the common cause of leaky tanks, which must be plastered or painted afterwards." The decision as to what is best must be left to the engineer and is controlled by the material available and his past experience.

A concrete tank costs more than other tanks, but the first cost ought not to be the governing feature. A careful comparison should be made of different designs and styles of construction of tanks having the same capacity and serving the same purpose and the cost per annum in each case arrived at. This cost is the average cost per year for the life of the structure and is made up of the original cost of the structure; the interest on the original cost for a period equal to the life of the structure; the total maintenance charges during the life of the structure; the interest on the maintenance charges from the time expenditures are made until the end of the life of the structure and the risk or liability of destruction by storm or fire, whether covered by insurance or not. The total of the above items, divided by the number of years of life of the structure, equals the cost per annum.

The report included descriptions of concrete tanks built for the Baltimore & Ohio at Sir Johns Run, W. Va.; for the cities of Norway, Mich., and Waverly, Ohio, and for the Chicago City Railway at Chicago.

Committee: F. E. Weiss (C. M. & St. P.); W. H. Finley

(C. & N. W.); W. M. Clark (B. & O.); D. C. Musser (Pennsylvania Lines West).

**DISCUSSION:** C. E. Smith (Mo. Pac.) stated that a wet concrete should be used to insure a waterproof structure.

A. S. Markley (C. & E. I.) believed that washed gravel should be used where a good mixture is desired, and the concrete should also be mixed wet.

R. H. Reid (L. S. & M. S.) believed that the concrete mixture should not be depended on to secure a watertight tank, but that it should also be waterproofed on the inside.

J. B. Sheldon (N. Y., N. H. & H.) stated that the Atlas Cement Company had made a careful investigation with the conclusion that concrete can be mixed too wet, as well as too dry.

W. M. Clark (B. & O.) believed that enough water should be used so that when the concrete is thoroughly rammed, the water will be drawn to the surface. He has had considerable experience with the repairing of old wooden tanks by reinforcing the inside with concrete. Five or six tanks on one division have been repaired in this way.

#### REINFORCED CONCRETE CULVERT PIPE.

Several roads are already adopting this form of construction for standard culverts under fills of all heights. There is no difficulty in designing reinforced concrete pipe to meet all conditions of loading, to secure sections with diameters up to 48 in. whose weight will permit handling by the same methods by which cast iron pipe is placed. Several miles of such pipe are being laid on the C. M. & St. P., this summer in connection with the construction of double track and changes of line. Concrete pipe is used instead of cast iron as far as the available supply permits, except in the extension of existing culverts or at points where the thinner cast iron pipe is more convenient, as in replacing a timber box culvert.

Possibly, in mountainous country where pipe would be laid on steep grades, the attrition of sand bearing water at high velocities might cause trouble with this class of pipe, by gradually scouring away the invert and exposing the reinforcing. Where timber trestles are being filled and the drainage area is such as can be cared for by a pipe, generally, the most economical opening to provide is a reinforced concrete pipe up to a diameter of 48 in. For openings larger than this some form of culvert built in place will be cheaper. The question of available material and length of haul will, of course, influence the type of opening used; however, an investigation on the C. M. & St. P. showed that even with carload tariff rates, a haul of 570 miles could be incurred and still make it economical to use the concrete pipe rather than cast iron. Aside from questions of cost, a properly reinforced pipe will be more apt to fail gradually in the event of breaking under the fill than will cast iron pipe. So far, however, no failures have been reported.

There is considerable variety in the types of pipe used and in the general dimensions and manner of reinforcing. For convenience in handling, the six ft. section adopted by the C. M. & St. P. proves a desirable length and provides units of ready adaptation to varying heights of fill. Sections of this length up to 48 in. in diameter are readily unloaded from cars without special appliances. The thickness of the pipe depends on the character and disposition of the reinforcement. In one type of patented pipe the reinforcement is disposed of so as to be situated in the region of tension throughout, the section being elliptical. Pipe of this kind must be placed with its major axis vertical and while permitting the use of thinner walls, it is not as convenient to handle as circular pipe which does not require a special position in service.

Recent experience of the C. R. I. & P., in using the longer 8 ft. sections on new line construction involving considerable team haul and transfer of pipe would indicate that shorter lengths are preferable. On new line work on the C. M. & St. P. their standard pipe was found much more convenient than the bell jointed pipe of longer section bought outside; and it was

found much more costly to place oval pipes than cylindrical ones, especial difficulty being experienced in rolling the former into place over rough and wet ground.

Most users of concrete pipe seem to adhere to the bell and spigot joints similar to those employed with cast iron pipe. One form of joint used is a modification of the bell and spigot, the bell having the same external diameter as the balance of the section, and the wall of the spigot end being tapered, with a band locking the reinforcing of adjacent sections together, the recess occupied by the band being afterwards filled with mortar. A pipe used on the B. & O. has three pockets recessed on the outside of the pipe which permit the wiring of anchors in adjacent sections together, the pockets afterwards being filled with mortar. In the C. M. & St. P., standard pipe, the ends are bevelled with the portions adjacent to the outer and inner circumference square. This results in a pipe with exterior and interior surfaces flush throughout its length when laid, insures an even bedding and greatly simplifies the forms required, as it reduces them to plane cylindrical surfaces, the bevels being formed by cast iron rings which serve to space the interior and exterior forms. A pipe having a uniform external diameter is much easier to handle and unload from cars, and can be quickly rolled off, while that having enlarged bells usually is loaded vertically, bell down, and is very cumbersome to unload on a main line without special equipment.

For the smaller sizes of pipe, some form of woven wire fabric seems to be used mostly with built up cages of light bars for the larger sections. For economy in handling, some form of reinforcing that will build up a stiff cage that can be handled and set in the forms without collapsing is desirable. In building the cages for the C. M. & St. P. type, experience showed that by wiring alternate hoops to the longitudinal reinforcement in opposite directions a stiff cage resulted, while if wired in the same direction it readily collapsed when laid on its side.

A period of 30 days for curing before putting the pipe in service seems desirable, though in summer this may be reduced to 20 days. One manufacturer writes that he had trouble with pipe which were shipped when 10 days old, due to the development of fine hair cracks, and that they now would not permit their pipe to be shipped out until a month old.

Concrete pipe can be unloaded by skidding from cars with snub lines, and can be rolled down embankments with less danger of breakage than cast iron pipe. In some instances, pipe are simply dropped off the cars and allowed to roll down the banks. Methods in general are the same as those used for unloading cast iron pipe, though some roads use derricks to handle the larger sizes.

Practice varies regarding filling the joints, some cementing them and others simply depending on the fit of the sections. It does not appear necessary under ordinary conditions.

Little information was received in regard to the type of forms used except that steel forms were considered superior to those of wood. On the C. M. & St. P. wooden forms were used when the manufacture was first started, but these are being discarded as they wear out, and are replaced by steel forms of the company's own design, and which are proving very satisfactory. About one year's steady service was found to be all that could be gotten out of wooden forms and the steel forms are much more economical.

There is practical unanimity regarding the saving effected by the use of concrete pipe in place of cast iron, the relative cost depending on local conditions, but being from 25 to 50 per cent. less. The economy is more marked with increase in diameter. With cast iron at \$28 per ton, and the market quotations for manufactured concrete pipe, the following shows the relative cost per lineal foot for the two kinds:

	24 in.	30 in.	36 in.	48 in.
Cast Iron .....	\$2.23	\$3.33	\$4.66	\$8.26
Concrete .....	2.00	2.80	3.15	4.50

The operation of the C. M. & St. P. concrete pipe plant at Tomah, Wis., was outlined in an appendix to this report, and

the specifications for the making of concrete pipe on the Illinois Central were also included.

Committee: L. D. Hadwen (C. M. & St. P.); H. H. Decker (C. & N. W.); R. O. Elliot (L. & N.); F. O. Draper (I. C.); F. E. King (C. M. & St. P.); G. Loughnane (C. & N. W.).

#### DISCUSSION.

C. E. Smith (Mo. Pac.) has found that when buying concrete pipe in the open market, culverts are cheaper for openings above 42 in. in size. With openings smaller than this, the economy depends on the type of iron pipe with which a comparison is made.

G. W. Andrews (B. & O.) found that culverts were cheaper than pipe for sizes over 48 in.

A. E. Killam (Intercolonial) uses concrete pipe made in four ft. sections with lock joints. On soft ground the pipes are placed on a bed of concrete and all pipes are seasoned one year before placing. He has never had a pipe break.

#### LONG PIPE LINES.

It is usually the case that water impounded for a gravity supply has to be carried a long distance to the point of use through pipe lines. If such is the case, a survey should be carefully made to endeavor to locate the line on an even grade without going into depressions or over rises. Where this is not possible air valves must be placed at all high points in the line to allow the air to escape, as it will always rise to the highest point and if not allowed to escape will retard the flow of water and eventually stop it altogether until the air is released. There are many air valves on the market and care should be exercised in the selection of the proper kind so that the attention necessary to keep it in condition will be greatly reduced and less failure will occur in the water supply.

The selection of the pipe best suited for the pipe line depends largely on the nature of the soil. This must be considered in view of its chemical contents to provide the proper kind of pipe to withstand the corrosive action of the soil in which it is to be laid, some soil being so bad that it is necessary to use wooden pipes, which are used successfully for many years while in the same soil iron pipe will last but a very short time. A paint or dip put on the pipe will prevent corrosion in some soils for many years if properly applied. Asphalt dip is one of the best and when put on properly will keep the soil from getting at the body of the pipe for years. A satisfactory method is to dip the pipe in asphalt at the proper temperature, the pipe also being heated. After the first coat roll the pipe in sawdust and when hardened dip again. In this way a coat of asphalt over  $\frac{3}{8}$  in. thick will be taken on which will withstand the action of the soil for a long time.

Tees with plugs or valves turned downward should be placed in a pipe line leading from a reservoir at intervals along the line so that the line can be opened and the accumulation of foreign matter may be flushed out. If this is allowed to remain it will gradually decrease the carrying capacity to a very considerable extent and lines have been known to fill up entirely from an accumulation of silt in a few years.

The expansion of long pipe lines has to be taken into consideration and the regular expansion joint of about six inches transverse should be placed according to the varying temperature of the locality. Pipe lines should be placed underground at a sufficient depth to protect them from the action of frost or extreme varying temperature.

In the construction of a pipe line the first thing to be done is to prepare the ditch properly. This should be dug to such a depth that the pipe will be below the frost-line when covered. This depth will vary according to the climate where the line is located. The trench must be level, or even on the bottom, so that the pipe will lie firmly on the ground, otherwise it will settle, and cause leakage. This precaution is especially necessary when laying wooden pipe, which should be driven firmly together, but care must be used to see that the joints are not

forced too hard, as this tends to split the joints away from the pipe. When backfilling, the utmost care should be used in tamping around and under the pipe so that no setting will take place, otherwise the pipe will settle both out of line and out of round.

The report included detailed information concerning the "Bonito" pipe line of the El Paso & Southwestern based largely on a description by J. L. Campbell in the proceedings of the American Society of Civil Engineers for December, 1910. In this it was stated that the cost of laying 384,300 lineal feet of wood pipe varying in diameter from  $3\frac{1}{2}$  to 11 in. averaged \$.0472 per lineal ft., which included unloading from the cars but did not include train service. The cost of laying 101,300 ft. of 12 in. cast iron pipe averaged \$.2343 including train service and unloading pipe. The cost of maintenance on this line is given as \$.25 per mile per day or \$.05 per thousand gallons delivered in its full capacity.

The report also gave considerable data concerning reservoir systems on the Western Australia Government Railways where several large reservoirs are in service. In one instance, to provide water for Kalgoorlie, a reservoir with capacity of 4,600,000,000 gal. has been provided, the water being carried to Kalgoorlie by a pipe line 351.5 miles long. The report concluded with specifications for a standard wood pipe line designed for a pressure of 80 lbs.

Committee: B. J. Mustain (E. P. & S. W.); E. S. Hume (Western Australia Govt. Rys.); D. Burke (S. P.); E. R. Floren (C. R. I. & P.), and W. C. Dale (O. S. L.).

#### DISCUSSION.

J. J. Taylor (K. C. S.) has considerable wood stave pipe in service under a maximum pressure of 75 lbs., which was laid about four years ago and has given considerable trouble, especially with blow outs.

A number of members reported difficulties with iron pipe lines covered with cinders and sand, and instances were reported where these materials had been replaced with clay or the pipe was boxed. The cost of boxing, however, is in many cases prohibitive. J. Ewart (B. & M.) reported much trouble with electrolysis and has found no method to protect against this. Much difficulty was also experienced in keeping intakes open in streams carrying sediment. J. H. Markley (T. P. & W.) has placed a stopper valve in a stream, which opens when the pumps are working and is closed at other times. C. R. Knowles (I. C.) reported using a twin strainer located next to the pump with good success. As each strainer can be operated independently, it is not necessary to stop the pumps when cleaning the strainers. W. M. Clark (B. & O.) places the openings in the down stream side of the intake, allowing rubbish to float past. In some instances he has used several small pipes instead of one large one to reduce the velocity at the entrance. It was generally agreed that it was not possible to exclude all sediment, but that the amount should be reduced to a minimum and be removed by hand. Where the sand is coarse Mr. Knowles uses old well screens successfully in several instances.

#### DEVELOPMENT OF TURNTABLES.

Practically all roads report short tables in service on old lines, but no road reported a standard length shorter than 75 ft. Twelve roads report their standard length as 75 ft.; 19 roads report 80 ft.; 13 roads report 85 ft.; 10 roads report 90 ft., and two roads report 100 ft.

In addition several roads report the use of turntables longer than their standard for special purposes such as the turning of Mallet locomotives, the elimination of frogs in approach tracks, etc. The longest table reported in use is on the C. M. & P. S., and is a pony truss table 105 ft. long weighing 175,000 lb. The committee recommends that for standard gage roads no future turntable be built shorter than 75 ft., and that for roads that expect to use the heaviest engines 90 ft. be adopted as standard. For engines having wheel bases longer than 90 ft. wye tracks

should be provided unless special local conditions compel the use and justify the expense of a longer table.

*Type of Table.*—The deck plate girder type appears to be desired by all concerned, but through plate girders and pony trusses are extensively used where it is difficult or impossible to secure drainage for the deeper pits required for the deck types, especially for the longer tables. Thirty-one roads use deck plate girders exclusively. Fifteen roads use deck plate girders wherever possible and through plate girders where drainage conditions demand, one road having used a through plate girder to decrease the necessary amount of excavation, the pit being located in solid rock. Seven roads have found the drainage of deep deck pits such an unsatisfactory procedure that they have adopted the through plate girders as standard. Four roads using deck girders state they would use through girders if drainage conditions demanded. The N. C. & St. L. states it would go to great expense, say \$3,000 or \$4,000, to avoid through tables.

Where through girders are used the best practice seems to favor providing supports for the ties by means of steel stringers and floor beams instead of using deep ties resting on shelf angles. The deep ties are expensive in first cost and in maintenance, and promote corrosion of the girder webs and shelf angles. The steel cross girders at the center of the turntable require a depth at least as great as that of a standard floor system, so the depth of pit need not be increased for the floor system. Where through girders are used they should not be placed less than 15 ft. between centers, as with a closer spacing the danger arises of men getting caught between an engine and the girder flanges.

*Drainage.*—The drainage of turntable pits, which has always been very important, becomes a much larger problem for the longer tables and deeper pits. Many engineers have had experience with pits that flooded during heavy rains or from flood water backing up through the drains. Although tables can be operated under such conditions, the results are very bad, particularly on account of the damage to the center. In addition the water in the pit sometimes freezes and stops operation. After floods it is frequently necessary to take the center apart for cleaning and oiling with consequent delays to locomotives. While such delays might not seriously inconvenience operation at an outlying point where few engines are turned, they cannot be tolerated at busy terminals where it is of the greatest importance that the turntables be maintained in continuous service.

In former years when shorter tables were used the depth of the pit was not great and drainage could easily be secured without serious trouble or the accumulation of water would not be deep enough to cause trouble. In case the lowest point of the engine house drainage is lower than the bottom of the turntable pit, the drainage of the pit can be made secondary to that of the engine house. In any case the most efficient, economical and satisfactory drainage is provided by catch basins and gravity drains where the highest water in the outlet is lower than the bottom of the pit. Where this condition does not obtain the problem of drainage can be simplified by the use of a through type of table, thereby decreasing the depth of pit, or by the use of shallow, non-tipping tables, that is, tables that rest on three or more points while turning.

*Center Foundation.*—All railroads replying to the circular uniformly report the use of concrete foundations and the necessity of great care in construction of the center foundation. The great majority reported bases 12 ft. sq. on 16 piles; in many cases it is stated on the plans that footings must rest on bed rock or on piles. Footings as large as 16 ft. sq. with 49 piles were reported. Many roads reinforce the top or bottom of the center concrete or both. The cap, especially on old foundations, is frequently of stone. When installing new tables on old foundations requiring a change in elevation of the top of the center it is quite customary to cast a reinforced concrete capstone of proper thickness, which when properly hardened is substituted for the old capstone during the changing of the tables.

Many cases were reported of the settlement of centers having been stopped by excavating a trench around the footing, extending down 2 or 3 ft. deeper than the old footing, and underpinning the old foundation as well as extending the base by filling the trench with concrete, piles being driven where necessary.

*Power for Turning.*—Where available electric power has the preference on practically all roads. Turning by air motors appears to have the next preference for outlying points where tables are not much used and where current cannot be obtained and where trouble with air motors, necessitating turning the table by hand, will not be serious. Gasoline engines are recommended for turning tables where electric current cannot be obtained and where liability of freezing renders the use of air motors objectionable. A few roads report the use of steam tractors on their tables.

*Circle Wall.*—Thirty-five roads report the use of timber coping on the circle wall for the support of the rails of the approach tracks and of short ties set radially and resting on the concrete for the support of the circle rail, some using creosoted timber, tie plates and screw spikes. Five roads report timber coping but rest the circle rail directly on the concrete.

The committee recommends providing a support for the ends of the approach rails on creosoted coping timbers, not less than 12 in. wide at the narrowest point, and preferably 8 in. thick, with two heavy standard tie plates under the end of each rail, where the rails are spaced so as to permit this, or a special plate not less than one in. thick, 12 in. wide and long enough to pass under the two near rails of adjacent tracks, the plates to be drilled for track spikes or screw spikes and for lag screws for attaching them to the coping timber. The coping timber should be attached to the concrete by anchor bolts.

The committee also recommends providing supports for the circle rail by short creosoted ties about 15 in. center to center under main tracks and 24 in. elsewhere, with tie plates and screw spikes where available. Where timber walls are used over hardpan or rock, blocking can be used, but extreme care must be taken in placing the blocking to break joints and in drifting the timber together to keep the wall from crowding forward. Where the foundation is not firm enough for blocking, piles should be driven to refusal, spaced about 3 ft. to 4 ft. center to center.

Where a concrete circle wall is used the greatest care must be taken to secure a sound foundation for the wall and for the circle rail in order to avoid settlement.

*Paving of Pits.*—Practically all railroads report the use of concrete or brick paving for turntable pits in standard installations at the most important points, concrete having the preference, but the majority of the roads also report many pits with no paving, the floor being finished with earth, cinders or gravel. There is no doubt that concrete or brick paving gives a much better appearing pit, but there is a question whether or not the expense is justified. The cost of paving, according to many of the plans submitted, will be close to \$1,000. A porous layer of cinder or gravel 6 in. to 12 in. thick will absorb all water and oil that runs into the pit and will prevent the occurrence of mud. The growth of vegetation should be very easy to stop.

*Cost.*—Cost figures of turntable installations are of very little value, as the cost is affected by so many conditions, such as locality, condition of market for material and labor, congestion at busy terminals compared with isolation at unimportant points, the detailed procedure that must be followed, the time within which the work must be completed, drainage and other factors. The turntable is such an important adjunct that attention should be given to good design rather than to keeping the cost low. In a very general way, however, it may be stated that average costs of turntable, complete, installed with tractor, may be taken as follows:

Deck tables, 75 ft.....	\$7,500
Deck tables, 80 ft.....	8,000
Deck tables, 85 ft.....	8,750
Deck tables, 90 ft.....	9,500
Through tables, 85 ft.....	11,500
Through tables, 100 ft.....	15,000

**Centers.**—Forty-six roads reported the use of manufacturers' standards of conical roller bearing centers, some with ball bearing or phosphor bronze discs at the ends of the rollers to reduce friction, and others depending on the cast top and bottom sections holding theirs in position.

The oiling of the moving parts of the center whether rollers, balls or discs is very important. The bottom casting should be so designed that the rollers, discs or balls can move in a bath of oil, and the top casting so designed that cinders, dirt or other grit cannot get inside. A mixture of black oil and signal oil is excellent for the lubrication of centers. They should be flushed out frequently by kerosene or gasoline, and should be taken apart and cleaned whenever they begin to turn hard.

Committee: C. E. Smith (M. P.); C. H. Fake (M. R. & B. T.); F. G. Jonah (St. L. & S. F.); J. S. Berry (St. L. S. W.); A. S. Markley (C. & E. I.).

#### DISCUSSION.

B. F. Pickering (B. & M.) has had unfavorable results with the disc center in several instances. Upon investigation he found that the tables were not turning on the phosphor bronze centers, but on the follower caps. In one instance a new table with a phosphor bronze disc was installed which required six men to turn it light. A steel disc was designed in two parts, and was made of low grade tool steel. When this was inserted, the table was readily turned, when loaded, by two men. This steel center has proved satisfactory after several months' service. Because of this experience he favored a roller bearing rather than a disc center.

C. E. Smith (M. P.) stated that he found no trouble with phosphor bronze centers until the tables were overloaded, when the oil was forced out and the steel moved on the bronze. R. H. Reid (L. S. & M. S.) has used graphite grease as a lubricant, and finds that even when the tables are overloaded and the grease is forced out the graphite remains. C. E. Smith (M. P.) advocated strongly the practice of a railway designing its own tables, and said that over 90 per cent. of the railways buy their turntables from the manufacturers on a competitive basis without specifications, and accept the manufacturers' designs.

There was considerable discussion regarding the proper construction of the circle rail to insure its remaining in proper surface and line. Among others B. F. Pickering stated that considerable difficulty had been experienced with ice forming back of the circle rail, which forced it out of line, and by forming on top of the rail made it run hard. His practice now is to place the circle rail on short ties, bolting it to them, which allows the snow and water to escape. H. C. Swartz (G. T.) stated that steam pipes are placed back of the circle rail and also about the center bearing, remedying difficulties with ice.

J. B. Sheldon (N. Y. N. H. & H.) believed that the difficulties with center bearings today are due to failure of the designs to keep pace with the increase in weight of locomotives, and that the rollers are commonly too small. Lee Jutton (C. & N. W.) advocated paving turntable pits to improve the appearance and to decrease the deterioration due to the collection of rubbish and dirt.

#### PAINTING OF STRUCTURAL IRON AND STEEL.

Scientific research and numerous practical tests have demonstrated the fact that certain paint pigments, though possessing excellent moisture repelling properties, will actually stimulate corrosion when applied directly to steel surfaces, while certain other pigments have a tendency to restrict and repress corrosion when used for primers and foundation coats. Because of this we divide the pigments into rust retarding, and air and moisture excluding ones, using the first for priming and contact coats, and the latter for finishing and exposed outer surface purposes. The pigments used in steel protective paints of the first kind are principally red lead, oxides and the like, while carbons, lamp blacks, graphite, etc., belong in the other class.

**Shop Coating.**—A rust retarding coat may be suitably compounded from red lead mixed with pure linseed oil, the average stock mixture consisting of from 25 to 30 lbs. of red lead to the gallon of oil. This mixture can then be reduced to the proper consistency at the time of application. A small amount of turpentine added to this brush coating will greatly help in its manipulation and will also provide for proper penetration. Red lead should always be mixed at the time of its application, for it settles quite readily, as it is an extremely heavy pigment. If so desired, the settling can be retarded, to a certain degree, by the addition of a small amount of asbestine (magnesium silicate) in the proportion of about 20 lb. of red lead and 2½ to 3 lb. of asbestine pulp to the gallon of linseed oil. A small amount of turpentine should also be added to this mixture for the purpose mentioned above. A good workman is required to properly apply red lead paint because of its more or less difficult application.

Natural oxides have also proven to be very good for priming purposes, and very satisfactory results are recorded from their use. A number of consumers favor oxides because of their easier application and the less expert class of labor required to apply it. A saving of from five to ten per cent., as compared with red lead paint, can thus be effected. Some concerns are using a combination of red lead and oxide and make good reports regarding it.

Although quite extensively used in former years, linseed oil is rapidly losing favor. It appears to be a universal opinion that this is not a desirable material for the prime coating of metals when used without the addition of pigments. A foundation coat of linseed oil is very often the direct cause of peeling and blistering of the other several coatings applied over it, for it is seldom dried enough to insure close adherence to the metal surface which it covers before the other paints are spread over it. Too much oil in a paint coating, particularly when the surplus is in or near the foundation coat, will generally cause blistering and peeling, regardless of the pigments used in the coatings. If, on the other hand, the erection or final completion of an oil coated structure should for some reason become delayed, this oil film, which deteriorates much faster than a paint coating, will have practically perished, its surface will be morbid and dead and will not have strength and stability enough to carry any subsequent coats, which when applied over this kind of a surface, will also peel.

**Field Coatings.**—Paints containing the same kinds of pigments as for shop coatings, can be successfully used for the first field coat, provided they are covered with another elastic outer coating. If that is not done, paints suitable for finishing coats should be applied, and the first field coat omitted. Red lead or oxide priming should be darkened for this coat by adding carbon or lamp black in the proportion of 90 to 95 per cent. of the reds and 5 to 10 per cent. of carbon mixed. The addition of this black will not only help to make the coating more elastic, but will act as a guide to determine if the former surface is being completely covered because of its darker shade and the shade is also brought nearer to the color of the black finish coating.

Carbon, lamp black and graphite pigments, singly or mixtures of them, have given best satisfaction as outer surface and finishing paints. These, combined with some inert and reinforcing pigments according to special formulas, form the basis for nearly every brand of paint for the satisfactory metal coatings on the market. The addition of some high grade gum like "Kauri" improves a finishing paint greatly, producing more elasticity, resistance and life. It is of course just as essential, that the oils entering into the makeup and composition of the various paints are of the proper kind and quality, as that the selection and composition of pigments be properly made and storekeepers or other officers charged with the duties of passing on the merits of goods purchased, should be very alert and strict in regard to linseed oil. Paints containing tar or those with a tar base should not be used on steel structures exposed to the sun and weather, as tar paint films rapidly check, crack and "alligator."

**Repainting.**—When for any reason it becomes necessary to

repaint an iron or steel structure, the paint should never be applied in wet or freezing weather, and the surface should be freed absolutely from all scale, rust, dirt, etc. It is not sufficient to merely apply a fresh coat of paint over an old paint surface under which traces of paint corrosion appear, for while the new paint will cover up the old surface, and may adhere firmly to it, corrosion goes on beneath the paint just the same. Freeing from rust and corrosion and perfect cleaning are positively necessary. When, for some reason, it is not possible that the entire structure can receive a coat of some rust retarding primer, the parts cleaned and freed from rust, and all the exposed surfaces, at least, should be touched up with either a red lead or oxide primer, before the finishing coat is given. The use of turpentine, in the paint applied over the old surface, is advised, as turpentine is a penetrant, providing the penetration and adhesion between the old paint film and the new coat.

Although more expensive, cleaning by sand blast is much more thorough than the hammer, chisel, scraper and wire brush method, and the greater cost is readily offset by better results in the end. Where the sand blast has been used, and the steel has been painted promptly, it has not shown signs of corrosion again nearly as quickly as steel cleaned by hand.

Committee: Chas. Ettinger (I. C.); R. H. Reid (L. S. & M. S.); E. E. Wilson (N. Y. C. & H. R.); O. F. Barnes (Erie); O. F. Dalstrom (C. & N. W.).

#### DISCUSSION.

C. Ettinger (I. C.) stated that lamp black will absorb 35 per cent. more oil than other pigments, and as oil is the life of paint, the black paints last longer and are coming to be generally adopted for railway structures. A. E. Killam (Intercolonial) said that climatic conditions are as important as the kind of paints selected. B. F. Pickering (B. & M.) finds that bridges along the coast require painting twice as often as those in the mountains, using the same paints in both places.

#### BRICK VS. CONCRETE IN BUILDINGS AND PLATFORMS.

Aside from local conditions the considerations of most importance in determining the relative merits of brick and concrete for use in railway structures are: Comparative cost, both in construction and in maintenance; safety; durability; fire resisting qualities; susceptibility of alteration, and adaptability to architectural treatment.

Economy is, of course, the most important consideration and with the increased standardization of structures throughout the country the more permanent structures generally prove the most economical. If cheapness of first cost is the controlling factor, or if structures are of a temporary nature, wooden structures should be used.

*Passenger and combination passenger and freight stations.*—Either brick or concrete, may be used with satisfactory results in the construction of passenger stations. Brick has been in successful use for many years while the use of concrete has been steadily growing for several years. For foundations of all kinds concrete is superior to all other kinds of material as it is cheaper and stronger. By the use of reinforced concrete the bearing area may be increased when necessary without great additional expense. For walls above the foundations there is not much difference in cost between plain concrete and good brick construction for the ordinary sizes of station buildings, costing up to \$15,000 or \$20,000.

Where variety of design is desired this can be secured by using a combination of brick and concrete in the walls, with concrete for the frame, columns, etc., and brick for the walls, pilasters and general decorative treatment. There will be little, if any, excess cost in this type of construction and very pleasing results may be obtained. Several railroads have used this type of construction to a limited extent with good results. Care must be taken to maintain good proportions by not allowing too much exposed concrete and to make a judicious selection of colors to obtain pleasing and harmonious results. The building

must likewise be adapted to its environment to give complete satisfaction.

Buildings having solid monolithic concrete walls are harder to heat in cold weather than if built of brick, even though air space is provided by furring on the inside. Special precautions must be taken to secure good ventilation to avoid dampness, for concrete absorbs a great deal of moisture in wet weather which gives the structure a rather disagreeable appearance. Monolithic walls can be constructed with air spaces and insulation in the walls so that dampness may be kept out and less difficulty is experienced in keeping the rooms warm, but such construction is expensive and not in general use, so it could not be recommended for buildings of this type.

Another type of construction that has given good results is the continuation of the concrete wall above the foundation up to the height of the window sills and the use of brick above. This much of the wall is generally plain and is not cut by openings other than doors, so that it needs no ornamentation or finish. It can be constructed comparatively cheaply and should be placed at the same time that the foundation is placed. This can be recommended as good practice.

Concrete blocks properly made can be used to advantage in buildings of medium size. When walls of one thickness of blocks are laid up, the cost is a little less than the cost of brick. The cost of buildings of this sort will be about 30 cents per superficial foot when blocks 8 in. thick are used. There are limitations, however, to this type of construction and to be most economical the building must be designed so that all dimensions shall be multiples of the size of the blocks used. This type of construction can be carried on in cold weather as well as brick work.

For use in larger buildings the cost of which exceeds \$50,000, splendid results have been obtained by the use of concrete throughout the entire construction. The Lake Shore and Baltimore & Ohio depot at Gary, Ind., is an example of such construction.

From the standpoint of safety there is no difference between the two classes of material for use in the walls of passenger stations provided perfect workmanship is exacted in both cases. There is greater danger at the present time of defects in concrete than in brick walls due to lack of experience on the part of the workman, so that when concrete is used thorough inspection must be maintained and the work entrusted only to foremen who understand thoroughly the nature of concrete and how it should be handled.

From the standpoint of comparative durability there is no choice between concrete and good brick. Concrete in itself would undoubtedly outlive brick in large masses, yet owing to the numerous other factors that determine the life of a building of this sort either material will answer equally well.

The comparative fire resisting qualities of concrete and such brick as may be used in building work is somewhat a matter of conjecture and depends upon the character of the fire. If a building has wooden floors, ceiling and roof timbers, a fire originating on the inside would completely destroy the building in either event. If the building is practically of fireproof construction throughout, a fire such as might occur in the ticket office furniture would not damage either materially. Either type would act equally well as a fire retardant from fires originating outside of the building. Slight fires might be liable to cause the surface of the cement to scale off, whereas brick would not be damaged at all.

Concrete work is not subject to extensive alteration and where alteration is a possible factor of importance brick is preferable.

Considerable has been said about the qualities each of these materials has that lend themselves to architectural treatment. There is no material superior to good brick for use in securing plain, durable and dignified effects. Brick possesses the advantage of many fine colors that lend themselves to varied treatment. Generally speaking the darker and softer colors are most readily adapted to most situations and are never injured seriously

by the smoke and dirt that are unavoidable about railroad stations. The lighter colored bricks likewise give good results when properly chosen.

Concrete takes its beauty from its appearance of strength and solidity. Its architectural treatment should be confined to plain surfaces, straight lines and arched effects over doors, windows, etc. Paneling can be used to advantage in some places. Where covered platforms are necessary much better effects can be secured if the sheds are supported on concrete columns arched over to support the roof, so that they have the appearance of a continuous part of the building.

*Freight Stations and Warehouses.*—Here again brick has been in successful use for many years. The latitude for using concrete, however, is wider than in passenger stations. For foundations concrete is preferable in all cases. For one story buildings reinforced concrete can be used with advantage in columns and girders, while thin curtain walls of brick or cement plaster on metal lath are especially suitable. The unit form of construction is well adapted to this class of structure. If the sections are allowed to harden and cure thoroughly before being erected there will be no possibility of their cracking as might occur if the concrete is poured in place.

If it is desired to use concrete floors and roof construction, the columns, frame, pilasters, beams, etc., should also be constructed of concrete. The curtain walls may be either of brick, hollow tile, reinforced concrete, or concrete plaster on metal lath. The latter, however, could scarcely be recommended in buildings when all other parts are of heavy concrete construction as the saving in curtain walls would be a doubtful economy. If wooden floors and roof construction are used, there is little choice between brick or concrete for the walls.

*Engine Houses.*—The experience of most roads has been that their engine houses have been outgrown and have had to be replaced because of inadequacy to meet conditions rather than of decrepitude, so that while this condition may not continue to be true of the future to so marked an extent, yet the factor of durability of material is secondary to first cost.

Considerable progress has been made in the construction of engine houses entirely of concrete. When it is desired to go to the expense of making the house essentially fireproof by making the roof, girders and posts of concrete and by using metal sash and fixtures as much as possible, then without doubt the balance of the construction should be of concrete. Some objection has been raised to concrete being used in the outer wall on account of the damage that may be done if an engine should accidentally run through. The wall should be so constructed that if this should happen the damage would be confined wholly to the curtain wall and would not extend to the pilasters or beams supporting the roof. If this is done, no greater and probably not as great damage will be done as would occur in a house having brick in ordinary construction in the outer walls. Where concrete is used more opportunity is given for window spaces in the outer wall.

*Shops.*—Reinforced concrete is particularly well adapted for use in the construction of shop and power house buildings. Either plain or reinforced concrete should be used throughout for foundations, both for the building proper and for the machinery. If the most durable fireproof buildings are desired reinforced concrete should be used throughout the entire construction. A peculiar advantage possessed by this type of construction lies in the freedom from vibration caused by machinery. In one story buildings especially, curtain walls may be constructed of cement plaster that will answer the purpose as well as solid construction and at less cost. Here also the unit construction method can be followed to advantage as buildings of this class will naturally be designed in bays of identical proportions.

Hollow concrete blocks have also been used to advantage in shop and power house construction. The air spaces in the blocks serve the very useful purpose of keeping out moisture and retaining the warmth, and thus overcome to a great extent two

of the most objectionable features of solid concrete in building construction.

It is our opinion that in the matter of cost of buildings of this class the outer walls can be built cheaper of common building brick costing from \$6 to \$8 per thousand and that the use of brick is safer if we consider the possibility of danger from poor workmanship. By the use of concrete foundation, brick walls, and cement tile roofs, supported by steel trusses, results as satisfactory as could be desired can be had.

For floors in such buildings neither brick nor concrete has proven entirely satisfactory. Creosoted wooden blocks on a concrete base are being tried and seem to be proving satisfactory. In some cases second hand bridge timbers have been cut up and used on a sand or cinder base. These give good satisfaction while new, but do not last as long as could be desired.

Committee: Geo. W. Hand, (C. & N. W.); H. A. Horning, (M. C.); G. H. Jennings, (E. J. & E.); Peter Hofecker (L. V.); W. F. Strouse (B. & O.); E. M. Dolan (M. P.); D. G. Musser (P. L. W.); P. E. Schneider (M. C.).

#### DISCUSSION.

M. A. Long (B. & O.) stated that experience in building the concrete passenger station at Gary, Ind., showed that furring is necessary to prevent sweating. At this station waterproofing was applied on the outside of the walls, but this is now beginning to peel and will soon have to be removed. His experience shows that as a general rule concrete stations cost more than brick because of the form work.

#### OTHER BUSINESS.

The subjects selected for committee work for next year were water supply; track scales (continued); equipment and tools for bridge gangs; concrete culverts and various kinds of pipe for culverts; heating and ventilating of roundhouses and shops; sewers and drains; motor cars for bridge and building gangs; temporary structures for supporting tracks during the construction of permanent work, sewers, etc.; concrete posts, poles, signs, etc.; snow fences; preservation of timber, framing on the job and results; and recent developments of cattle guards.

At the closing session on Thursday morning the following officers were elected for the ensuing year: President, A. E. Killam (Intercolonial); first vice-president, J. N. Penwell (L. E. & W.); second vice-president, L. D. Hadwen (C. M. & St. P.); third vice-president, T. J. Fullem (I. C.); fourth vice-president, G. Aldrich (N. Y., N. H. & H.); secretary, C. A. Lichty (C. & N. W.); treasurer, J. P. Canty (B. & M.). Members of executive committee: G. W. Rear (So. Pac.), W. F. Steffens (B. & A.), E. B. Ashby (L. V.), C. E. Smith (M. P.), S. C. Tanner (B. & O.), and Lee Jutton (C. & N. W.).

On Monday evening the president held an informal reception for the members and families attending the convention. On Tuesday evening an informal luncheon was held at the Emerson Hotel roof garden, and on Wednesday evening a theater party was provided. In addition numerous rides were arranged for the ladies.

Montreal was selected as the location for next year's convention.

#### SUPPLY ASSOCIATION EXHIBIT.

The Bridge and Building Supply Men's Association held an exhibit of appliances adjacent to the convention hall. About thirty firms were represented. The officers for the past year were: President, T. E. Wolcott, U. S. Wind Engine and Pump Company; vice-president, H. Henning, Eastern Granite Roofing Company; secretary, D. A. Bonitz, National Roofing Company; treasurer, J. A. Meaden, Paul Dickinson, Inc. The following firms exhibited:

American Hoist and Derrick Company, St. Paul, Minn.—Transparent photographs of American ditcher in bridge work. Represented by F. J. Johnson and W. O. Washburn.

American Valve and Meter Company, Cincinnati, Ohio.—Poage automatic water columns and automatic cut-off valves. Represented by J. T. McGarry and F. C. Anderson.

Asphalt Ready Roofing Company, New York.—Protection and Arrow brand roofing, Hudson brand asphalt felts. Represented by H. H. Husted and W. A. Hemenway.

Barrett Manufacturing Company, New York.—Coal tar products, prepared roofing, bridge waterproofing paint, and tar-rock sub-floor construction material. Represented by L. P. Sibley, H. B. Nichols, E. J. Caldwell and W. S. Babcock.

Carey Company, Philip, Lockland, Ohio.—Asphalt roofing, asphalt shingles and roofing material. Represented by N. S. Kenney, D. R. Warfield, O. A. Bigler and Richard Kelly.

Chicago Pneumatic Tool Company, Chicago.—Pneumatic tools and Rockford motor car. Represented by C. E. Walker, J. W. McCabe, E. A. Barden and Thos. Aldcorn.

Clapp Fire-Resisting Paint Company, Bridgeport, Conn.—Samples of fire-resisting paint. Represented by W. A. Clapp.

Detroit Graphite Company, Detroit, Mich.—Samples of graphite and photographs of applications. Represented by Tom Wyles, DeWitt C. Smith and J. J. Hogan.

Dickinson, Paul, Inc., Chicago, Ill.—Ventilators for stations and buildings. Represented by J. A. Meaden and A. J. Filkins.

Dixon Crucible Company, Joseph, Jersey City, N. J.—Photographs picturing applications of silica graphite paint. Represented by H. A. Neally and N. A. Houston.

Eastern Granite Company, New York.—Samples of Granite and Tisbest roofing. Represented by H. Henning, W. F. Sachs and G. B. Skinner.

Fairbanks Co., New York.—Represented by F. C. Mattern and J. R. Meginnis.

Fairbanks, Morse & Co., Chicago.—Represented by C. W. Kelly, F. H. Douglas and J. L. Jones.

Flintkote Manufacturing Company, Boston, Mass.—Represented by P. J. Everett and C. D. Townsend.

Forest City Paint & Varnish Company, Cleveland, Ohio.—Represented by W. B. Wood.

Johns-Manville Co., H. W., New York.—Regal and asbestos samples, asbestos stucco. Represented by J. E. Meek, G. A. Nicol, W. H. Lawrence and H. G. Newman.

Lehon Co., Chicago.—Roof-rite roofing and Per-bona insulating papers, Tex-proof saturated burlap and Roof-rite reinforced cotton duck roofing. Represented by Tom Lehon.

Millburn Co., Alexander, Baltimore, Md.—Acetylene flare lights for night construction work. Represented by C. R. Pollard and F. W. Mallen.

National Roofing Company, Tonawanda, N. Y.—Samples of "Security-wide-weld roofing" and asphalt shingles. Represented by D. A. Bonitz and A. Clarke.

Patterson & Co., W. W., Pittsburgh, Pa.—Pulley blocks and tackles. Represented by W. W. Patterson, Jr.

Richards-Wilcox Manufacturing Company, Aurora, Ill.—Railway hardware, door hangers and rollers. Represented by W. D. Jameson.

Simmons-Boardman Publishing Company, New York.—*Railway Age Gazette*. Represented by E. T. Howson and Kenneth G. Cloud.

Standard Asphalt & Rubber Company, Chicago.—Represented by Norman Malcolm and C. V. Eades.

The Texas Company, New York.—Samples of insulating papers and asphaltum. Represented by W. E. O'Neill, G. A. Huggins, F. K. Dorrance and L. F. Jordan.

Wadsworth-Howland Co., Chicago.—Represented by E. E. Allen.

Webb Manufacturing Company, F. W., Boston, Mass.—B. & M. combination railroad closet, Webco unions and valves. Represented by G. H. Ayer.

U. S. Wind Engine & Pump Company, Batavia, Ill.—Represented by L. E. Wolcott and C. E. Ward.

At the annual business meeting the following officers were elected: President, H. Henning, Eastern Granite Roofing Company; vice-president, J. A. Meaden, Paul Dickinson, Inc.; secretary, H. A. Neally, Jos. Dixon Crucible Company; treasurer, D. A. Bonitz, National Roofing Company.

**LINE OPENED IN CHILE.**—The department of railways of the government of Chile has opened to public traffic the railway from Osorno to Puerto Montt in southern Chile.

**LABOR ON THE GRAND TRUNK PACIFIC.**—W. F. Carey, one of the contractors working on the Grand Trunk Pacific, is quoted as saying that there are at least 7,000 men at work on the section between Fort George and Tete Jaune Cache. He says that there is an unusually good supply for railroad work at this time and accounts for the fact that labor prefers railroad work to farm work by pointing out that the camps on the main line of the Grand Trunk Pacific are extraordinarily good and that the food is also much better than usually provided in construction camps.

## THE FOREMAN PROBLEM.\*

By F. M. PATTERSON,

Assistant Engineer, Chicago, Burlington & Quincy, Chicago, Ill

Conditions in railway service in this country have changed materially in the last 15 or 20 years, and in no branch of the service have they changed more for the worse than in the track department. The native and the intelligent foreign laborers are dropping out and being displaced by illiterate immigrants from Southern Europe who have little of the skill or judgment called for in maintaining track and practically no capacity for directing the work of others. How shall we induce the right kind of young men to enter the gangs and acquire the experience necessary to fit them for foremen?

The first reply is to raise wages. This is partly right, but by itself is probably the least effective and is the hardest to put into operation. Unless it can be demonstrated that this increase can be made to secure more efficient methods, as well as more efficient men we cannot expect to secure such increases from our railway managers. The fact that properly trained workmen will often do three times as much work as those whose training has been poor, and that the compensation needed to get the efficient work is very rarely increased more than 50 per cent., is the best argument for systematically training workmen.

Probably the greatest improvement that can be made in methods lies in organization. At present all track labor is paid practically the same rate on a given section, except that track laying gangs are sometimes paid a somewhat higher rate, more on account of the heavy physical labor than for the greater skill required. If the work could be divided so that that part of it which requires skill and intelligence could be paid for at a higher rate than that which requires only physical strength it is probable that a desirable class of young men could be secured. This may seem to be a radical suggestion, but why should a proposal to recognize the difference between skilled and unskilled labor by a suitable difference in wage be regarded as extreme?

The suggestion is never made that all employees in the machine shops—machinists, helpers and laborers—should be paid the same scale and that the scale should be based on the pay for the laborers. This division of the work can be accomplished by organizing extra gangs which may serve as training schools for the embryo foremen. But, as far as possible, all work on a section should be done by the section forces under the direction of the foreman himself. With the present length of sections we cannot give the foreman a gang large enough to divide into two squads, one of skilled, the other of unskilled labor, but if we can materially increase the length of the sections it might be accomplished with little or no actual increase in cost per mile. The use of the motor car will allow this increase and enable the track to be kept up as well as with the shorter section. Reports on the operation of these cars have been made at different times by roads operating under diverse conditions, and all reports show important savings. There are many other devices, as for instance, rail and ballast unloaders, and rail relaying derricks that save hard physical labor, rendering the work less distasteful, and which will usually be found economical besides.

To furnish a supply of foremen, steady employment should be provided as far as possible, and efforts should be made to keep the best men the year around. It may be possible to postpone certain work until the winter, and it may be possible to transfer these men to certain lines of employment where men are needed only during the winter months.

In approaching this subject it will be of service to learn what efforts have already been made, and for this, a treatise on "Education for Efficiency in Railroad Service," by J. Shirley

\* Received in the contest on The Section Foreman Problem, which closed March 25, 1912.

Eaton, formerly statistician of the Lehigh Valley, will be most valuable. This was issued in 1909 as bulletin No. 10, by the United States Bureau of Education, and may be had free on application to the Department of the Interior at Washington.

### METHOD OF LOADING EXPLOSIVES FOR A BIG BLAST.

Early in May of this year a large blast was made in a quarry at Piedra, Cal., for the Sharp & Fellows Contracting Co., by the E. I. du Pont de Nemours Powder Company, Wilmington, Del. All the rock, which is used for ballast, concrete rock and building purposes generally, is handled by a steam shovel, and to facilitate handling, it was decided that the maximum quantity of rock should be broken in sizes that could be handled without subsequent bulldozing or mudcapping. Fig. 1, a photograph taken before the blast, shows the quarry floor, which was 100 ft. wide at this point, and 1,200 ft. long. This photograph also shows, by the light waste dumps, the location of the tunnels which were driven to properly contain the various charges of explosives.

The results shown in Fig. 2 indicate the accuracy with which the charges were estimated and placed. They also show the large proportion of fine rock, 85 to 90 per cent., and that prac-

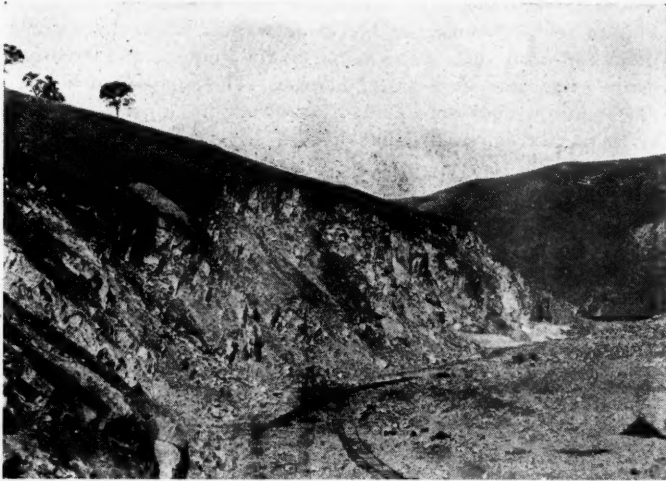


Fig. 1—Appearance of Quarry Before Shot Was Fired.

tically all of the broken rock remained on the quarry floor, only one rock of any size being thrown over the edge.

The tunnels, shown in the plan view, were driven level with the quarry floor and at right angles to the face. Four cross cuts, two in each direction and parallel to the face, were driven from each tunnel to contain the explosive charge. At the end of each cross cut a sump or pit about six ft. deep was excavated to give the maximum amount of breakage and reduce to a minimum the projecting of pinnacles of rock to the quarry floor, which would delay the steam shovel while they were being blasted out.

The overburden at the breast of the tunnel varied from 70 ft. to 104 ft., or an average overburden of 91 ft. over the back powder charges, and an average of 68 ft. for the entire area.

The charge, estimated to produce a maximum amount of fine material, and at the same time waste no material into the King's river, was 114,000 lbs. of Judson R. R. P. and 11,400 lbs. of Hercules 60 per cent. nitroglycerin dynamite, a total of 125,400 lbs. of explosives. This charge was distributed in the cross cuts as follows:

Loca- tion.	Pounds Hercules 60% N.G.	Pounds Judson R.R.P.	Loca- tion.	Pounds Hercules 60% N.G.	Pounds Judson R.R.P.	Loca- tion.	Pounds Hercules 60% N.G.	Pounds Judson R.R.P.
A .....	600	6,000	I .....	700	7,000	O .....	700	7,000
B .....	650	6,500	J .....	700	7,000	R .....	700	7,000
C .....	250	2,500	K .....	250	2,500	S .....	250	2,500
D .....	250	2,500	L .....	250	2,500	T .....	250	2,500
E .....	700	7,000	M .....	700	7,000	U .....	700	7,000
F .....	700	7,000	N .....	700	7,000	V .....	800	8,000
G .....	250	2,500	O .....	250	2,500	W .....	250	2,500
H .....	250	2,500	P .....	250	2,500	X .....	300	3,000

Tunnel No. 1 had the least overburden, and it was undesirable to obtain very much overbreak to the left, because a quantity of rock at this side was too hard for the crusher to handle, and it was desired to leave this rock in place to be blasted out later and wasted on the dump. The blast swept round his hard rock, leaving it practically undisturbed. Tunnel No. 6 had a heavy overburden and a maximum overbreak was desired, so the two cross cuts driven to the right from this tunnel were made 5 ft. longer and were loaded heavier than the others.

The Hercules dynamite was not removed from the cases, but

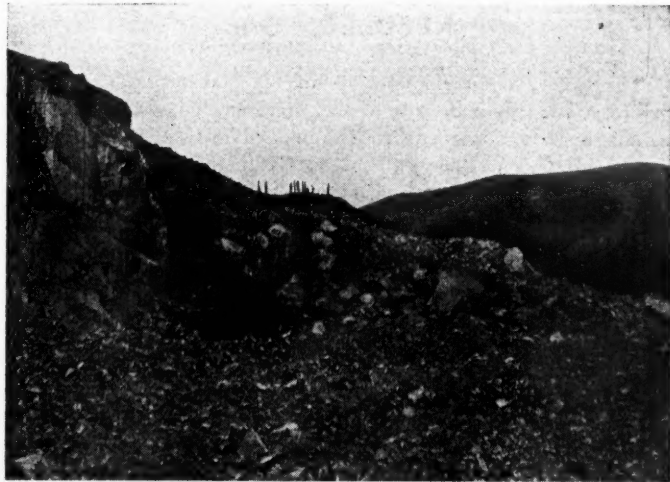


Fig. 2—Results of the Blast.

all Judson powder was removed and taken into the tunnel in the original bags, 200 lbs at a time. This was stowed snugly in the pits at the ends of the cross cuts, being tamped down by tramping on the charge.

Tunnels 2, 3 and 4 were wet with considerable water dripping from the walls. All the pits in these tunnels were filled to a depth of 18 in. with large rock, and the chamber was entirely lined with many thicknesses of paraffine paper from the Judson powder cases to keep the powder dry. It was calculated by actual observation and measurement that the water seepage would about fill the interstices between the large rocks in the bottoms of these pits shortly after the loading and tamping was completed.

One Victor No. 6 electric fuse was used in each charge, all

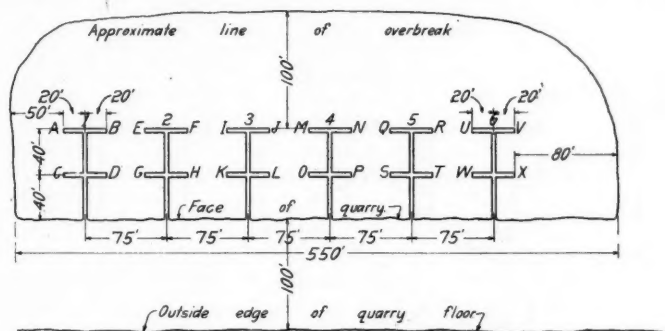


Fig. 3—Plan of Tunnels and Cross Cuts for Placing Explosives.

being connected in simple series of 24. The connecting wire in each tunnel was trailed along at the junction of the floor and wall and covered with several inches of fine muck for protection while loading and tamping. All cross cuts were entirely filled, as well as the tunnels, to within 10 ft. of the portals with muck from the tunnel floors. This material was well stowed away from the top of the tunnels to eliminate air space, as much as possible. All wiring was tested every two hours with a galvanometer during the entire time of loading and tamping, which took seven days, working day and night.

A No. 4 pull-up blasting machine was used to furnish electric current to detonate the fuses. This battery was first tested with

a rheostat showing a capacity of 55 fuses, so there was plenty of excess current available.

The total breakage was estimated to be at least 350,000 cu. yds., at a cost for explosives of not over 2.6 cts. per cu. yd., even though this shot was heavily loaded in order to get as fine breakage as possible. This heavy loading saved a good proportion of the added cost of mudcapping and resulting delay to steam shovel work.

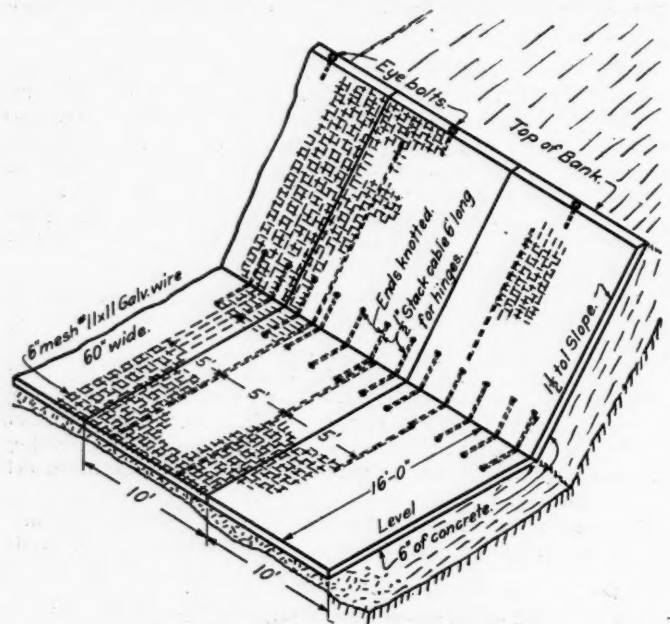
### COLORADO RIVER BANK PROTECTION AT NEEDLES, CAL.

The Colorado river in the vicinity of Needles, Cal., where it is crossed by the main line of the Atchison, Topeka & Santa Fe, winds back and forth through an alluvial valley cutting the banks away wherever the current impinges. To prevent the undercutting of storage and industry tracks which the company maintains along the river in the city of Needles a concrete apron



Location of Concrete Apron for Bank Protection; Atchison, Topeka & Santa Fe, Needles, Cal.

has been applied on the west bank for a distance of about 2,500 ft. A 6-in. blanket of concrete was laid on a slope of about  $1\frac{1}{2}$ :1, the toe of the slope being from 15 to 20 ft. back from the water's edge and somewhat below water level. This blanket varies in height from 9 ft. to 15 ft., depending on the natural height of the bank. The concrete is reinforced with American wire

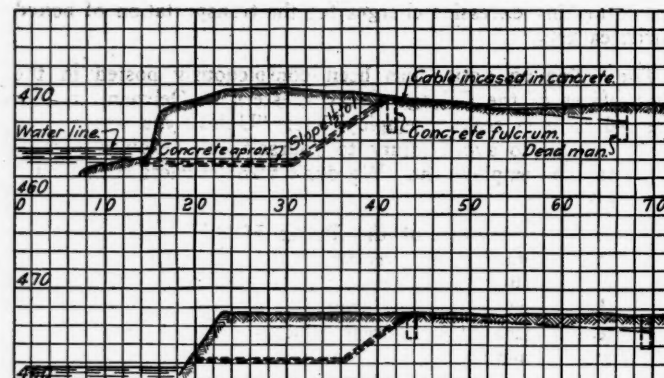


Plan of Concrete Apron.

fencing, No. 5 wire, with 6-in. mesh, and was placed in vertical sections 10 ft. wide, the adjacent sections being bonded together by tying the reinforcement at the edges. An apron of similar construction about 16 ft. wide was laid horizontally from the bottom of the slope and hinged to the inclined blanket by 1-in. cables or other available rods. Short sections of cable about 6 ft. long, spaced about 2 ft. apart, were used for this hinge, and at 5-ft. intervals anchor rods were imbedded in the concrete

running up through the inclined blanket over a concrete fulcrum at the top of the slope and back to creosoted piles or concrete "dead men" 25 ft. back from the bank. This anchorage is intended to prevent the slipping of the whole mass if such a tendency should develop. An eye-bolt was set in the upper end of each blanket section for attaching additional anchor cables if necessary.

The object in designing the horizontal apron with hinge con-



Cross-Section of River Bank at Needles, Cal.

nection to the blanket on the slope was to allow the apron to gradually drop, due to the action of the current, and eventually to take the same slope as the blanket. The surfaces of both the apron and blanket were gashed into 5-ft. squares, while the concrete was green, so that any uneven settlement that may occur will cause the concrete to crack along these lines.

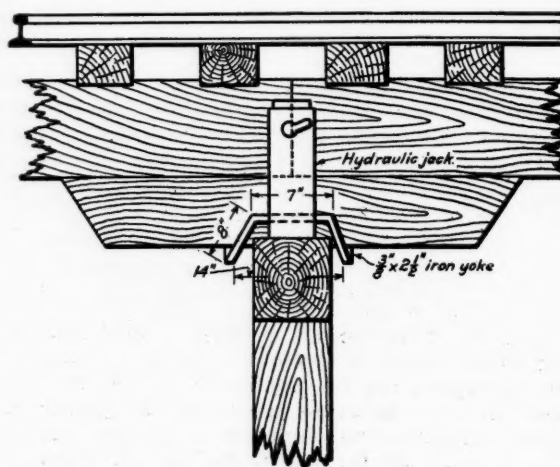
We are indebted to G. W. Harris, chief engineer of the Santa Fe's Coast Lines, for information concerning this work.

### AN IRON YOKE FOR SHIMMING BRIDGES.

By R. B. ABBOTT,

Division Engineer, Philadelphia & Reading, Harrisburg, Pa.

In the issue of the *Railway Age Gazette* of July 19, 1912, a "Z" bar was described which was used when shimming bridges. The accompanying drawing shows another method for doing the same work in which an iron yoke is used instead. On this road the trestles are all built with corbels instead of allowing



A Yoke for Raising Stringers.

the end of the stringers to rest directly on the cap; although the yoke can be used equally well with either construction. This yoke is made of  $\frac{3}{8}$  in. x  $2\frac{1}{2}$  in. iron. The center portion rests on the footlift of the jack, while the ends are bent to pass under the corbel or stringers. In this way, as the foot of the jack is raised, the stringers are lifted at the same time. Because of the fewer number of parts, we prefer this method to the use of the "Z" bar.

## General News.

The roundhouse and repair shops of the Wabash, Chester & Western at Chester, Ill., were destroyed by fire on October 8. The loss is estimated at \$40,000.

The St. Louis & San Francisco has been indicted by the grand jury at St. Louis, Mo., for violation of the interstate commerce law in making excessive charges for the transportation of boxed burial caskets.

The following notice has been conspicuously posted in the shop offices of the Chicago Great Western at Oelwein, Ia., addressed to men seeking employment: "Unless you are willing to be careful to avoid injury to yourself and fellow-workmen, don't ask for employment. We don't want careless men in our employ."

The surgeon general of the Public Health Service has advised the secretary of the treasury to issue an order forbidding the use of public drinking cups on railroad trains. It appears that a law passed at the last session of Congress gives the federal health authorities increased power of regulation over interstate commerce.

The United States Civil Service Commission announces competitive examinations on November 11 for mechanical draftsmen, male, salary \$900. Blanks may be had from the secretary of the Seventh Civil Service district, Chicago. On November 20 and 21 there will be an examination for heating and ventilating draftsmen, salary \$1,200.

The Metropolitan Electric Tramways Company, of London, England, has ordered 300 motor omnibuses, double deck, to be used in carrying passengers on the streets of London. It is said that this radical innovation has been forced on the company by the enormous increase from year to year of the use of ordinary motor busses in the streets of London.

Pierre Daucourt, a French aviator, on October 6, made a flight of 570 miles in 11 hours, 39 minutes, and thereby won a prize for the longest straightaway flight between sunrise and sunset. He started from Valenciennes at the northern boundary of France in the morning and landed at Biarritz, in the southwest, at 5:38 p. m. He stopped three times to replenish his supply of fuel.

The strike of trainmen on the Georgia Railroad was settled October 12, the company and the representatives of the employees having agreed to submit disputed questions to an arbitration board to be arranged for by Commissioner Charles P. Neill, of Washington. Passenger traffic was resumed on Sunday and freight traffic on Monday, after a suspension which had lasted twelve days.

The Chicago Great Western on October 1 opened a railroad business school at Dubuque, Ia., to educate young men in telegraph and station work. The school will be under the supervision of the Educational Bureau with L. B. La Force as instructor. Young men residing along the line of the Great Western, particularly sons of employees, will be given preference in the enrollment.

Miss Beulah Chandler, 18 years old, living near Potts Valley Junction, W. Va., walking one day, not long ago, in the rain, along the track of the Norfolk & Western, distinguished herself and possibly saved a trainload of passengers from a derailment, by flagging and stopping passenger train No. 1, when she found a tree lying across the track. As printed in the newspapers, her exploit was somewhat exaggerated; but she is deserving of credit, for she had neither hat nor umbrella, and used her apron as a flag. Incidentally this reminds us that a "little red petticoat" is not the only thing with which to stop a train.

### "Boston & Albany."

The Boston & Albany, leased to the New York Central & Hudson River, announces that the 4,000 new box cars, 400 platform cars, 20 passenger cars, 21 locomotives, and other rolling stock recently ordered, and which will be delivered within the next two or three months, will be lettered with the name of the

owning road and not the name of the lessee; and this concession to local pride is to be carried out in connection with all of the rolling stock of the company as fast as it needs repainting. People who have complained about the absence of the word "Boston" on the cars of the company have often undertaken to support their complaints by the charge that it was a mistake ever to lease the road to a New York corporation. To this the answer is now made that the gross receipts of the road for traffic in the past year—\$16,000,000—were about 60 per cent. more than the receipts for the last year prior to the making of the lease. The present action is in line with that taken last year, when complete executive authority was placed in the hands of Vice-president Hustis, at Boston, thus relieving the Bostonians of the unpleasant feeling that their main trunk line to the West, formerly owned in part by the state of Massachusetts, was being bossed by men in New York.

### Great Western Watches Given Surprise Tests.

W. A. Garrett, vice-president of the Chicago Great Western, has started a campaign on his road for the purpose of keeping constantly before the men, especially those in the train service, the necessity of making exact time, and also for the purpose of creating a rivalry among them for the greatest accuracy of their watches. On a recent inspection trip over the system he took with him General Time Inspector Forsinger and inaugurated a surprise test of the watches of employees and of all the officers who were met on the trip. Without any warning each man was asked for his watch, and a record was kept of the variation from the time of a standard chronometer carried in Mr. Garrett's car. The average variations for the different classes of employees were then posted up to show the divisions on which the best time was kept. The Chicago division ranked first for enginemen; the eastern division for firemen and brakemen; the southern division for conductors and yard foremen; the northern for agents, and the western for operators. No engineman or conductor had a variation of over 45 seconds. The test will be repeated, and it is hoped that by getting the men interested in the rivalry and talking about time a strong impression will be created of the importance of being exactly on time.

### Texas Welfare Commission Recommends Changes in Texas Laws.

The Texas Welfare Commission, which has recently conducted several hearings for the purpose of ascertaining what changes ought to be made in the Texas railway laws for the purpose of encouraging railway construction in the state, has adopted the following recommendations which will be submitted to the legislature at the next session:

1. That all bonds or other such obligations lawfully issued and sold may be refunded regardless of any valuation fixed by the railroad commission.
2. That bonds may be issued for betterments, improvements or extensions, regardless of any valuation theretofore fixed by the railroad commission.
3. That the process for issuing bonds be changed so as to authorize the issuance and sales of such securities as the money is required, either before, during or after construction, instead of only after construction, as is now the case, but providing for strict application of the proceeds to the purposes for which authorized.
4. That the sale of bonds by new railroads be authorized providing safeguards insuring the proper application of the proceeds.

### Unfilled Tonnage of the Steel Corporation.

The report of the United States Steel Corporation shows that on September 30 the unfilled tonnage was 6,551,507 tons, an increase of 388,132 tons over the previous month. On July 31, 1912, it was 5,957,079 tons; on June 30, 5,807,346 tons, and on September 30, 1911, 3,611,317 tons. The increase last month was larger than expected, even by the most optimistic. Earlier in the season predictions had been freely made that July, August and September would show a shrinkage in orders. The unfilled tonnage showed an increase of 750,000 tons during those months. During September orders for new business exceeded shipments

by an average of 15,500 tons daily. The unfilled tonnage on September 30 was larger than at any time since June 30, 1907, when it was 7,603,878 tons.

#### Election of Officers, American Electric Railway Association.

General George H. Harries, who is associated with H. M. Byllesby & Co., Chicago, and is president of several electric railway companies, was elected president of the American Electric Railway Association at the closing session of its convention in Chicago last week. Other officers elected were: Vice-presidents, Charles N. Black, San Francisco; C. Loomis Allen, Utica, N. Y.; C. L. Henry, Indianapolis; John A. Beeler, Denver; secretary-treasurer, H. C. Donecker, New York. J. H. Neal, of Boston, was elected president of the Electric Railway Accountants' Association; C. A. Avant, of Birmingham, Ala., president of the Claim Agents' Association; Dana Stevens, Cincinnati, president of the Transportation and Traffic Association. These officers constitute the new executive committee of the American Electric Railway Association.

#### Chicago Car Foremen's Association.

The annual meeting of the Car Foremen's Association of Chicago was held at the Karpen building on the evening of October 14. After a short business session for the election of officers the programme included a vaudeville entertainment, dancing and a buffet luncheon. The officers elected were as follows: President, F. C. Schultz, chief joint inspector Chicago Interchange Bureau; first vice-president, J. W. Singer, master car builder, Lake Shore & Michigan Southern; second vice-president, Geo. F. Laughlin, general superintendent Armour Car Lines; treasurer, M. F. Covert, assistant master car builder, Swift Refrigerator Transportation Company; secretary, Aaron Kline.

#### American Society of Engineer Draftsmen.

At the regular meeting of the American Society of Engineer Draftsmen, held in New York, October 17, James H. Fitzgerald, Mem. Am. Soc. E. D., read a paper on The Draftsman in Tunnel Construction Work. This paper was illustrated by stereopticon views. There was also a lecture on Rational Methods of Machine Design by Professor Walter Rautenstrauck, of Columbia University. Walter M. Smyth is secretary.

#### American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, held October 16, a paper was presented for discussion entitled, A Brief Description of a Modern Street Railway Track Construction, by A. C. Polk, Assoc. M. Am. Soc. C. E. This paper was printed in the *Proceedings* for August, 1912.

#### MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Convention, May, 1913, St. Louis, Mo.  
AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.  
AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York.  
AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.  
AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, St. Louis, Mo.; 3d Friday of March and September.  
AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.  
AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.  
AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; semi-annual, November 20, 1912, Chicago.  
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.  
AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Convention, March 18-20, 1913, Chicago.  
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.  
AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn.  
AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.; annual, June, 1913.  
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.  
AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.  
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.  
ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago.  
ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago.  
ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, October 21-25, Chicago.  
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago; annual, May 20, 1913, St. Louis, Mo.  
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Meeting Dec. 10-11, 1912, New Orleans, La.  
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.  
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.  
CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.  
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.  
CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.  
ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.  
ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.  
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.  
GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.  
INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.  
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago.  
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala.  
INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio.  
MAINTENANCE OF WAY MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—W. G. Wilson, Lehigh Valley, Easton, Pa. Convention, November 19-21, Chicago.  
MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Convention, May 26-29, 1913, Chicago.  
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.  
MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass.  
NATIONAL RAILWAY APPLIANCE ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.  
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.  
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.  
NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.  
PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.  
RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.  
RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York; annual, November 20, 1912, New York.  
RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.  
RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.  
RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.  
RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo. Next meeting Nov. 17, 1912, Cincinnati, Ohio.  
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.  
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.  
RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.  
RAILWAY TEL. AND TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.  
RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.  
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill.  
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.  
SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.  
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago; annual, October 23-25, Atlantic City, N. J.  
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.  
SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.  
TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.  
TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.  
TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.  
TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.  
TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.  
TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago.  
TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.  
TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.  
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.  
UTAH SOCIETY OF ENGINEERS.—R. B. Ketchum, University of Utah, Salt Lake City, Utah; 3d Friday of each month, except July and August.  
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.  
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.  
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

## Traffic News.

The Pennsylvania Railroad at Philadelphia has announced a reduction of five days—from ten days to five—in the free time allowed for the storage of hay and straw.

Shipments of apples from the state of Washington and adjacent states this year will aggregate 20,000 carloads, according to estimates made at Tacoma. Large quantities of apples are being sent to Australia.

The Southern Railway this season is making horticultural and agricultural exhibits not only at all of the principal fairs in the southern states, but also at 25 fairs and expositions in the northern and western states and in Canada.

The Duluth, South Shore & Atlantic is operating a special live stock instruction train over its line through the upper peninsula of Michigan. Lectures and demonstrations are being given, and the train is equipped with cattle, poultry and other agricultural exhibits.

A sleeping car is now run through daily each way between New York and Chicago, over the Delaware, Lackawanna & Western and the Michigan Central, in 25 hours. The car leaves New York on train No. 5 at 2 p. m., and is taken into Chicago on the Wolverine. It leaves Chicago at 5:40 p. m., and is taken into New York on the Lackawanna Limited. Heretofore there have been no through cars over this route.

Compromises have been effected between the rice milling interests of New Orleans, La., and Houston, Tex., and the traffic officers of the Texas & Pacific, whereby the New Orleans rice men will withdraw their complaint before the Interstate Commerce Commission regarding the milling-in-transit privileges on rice. The agreement provides that they shall receive milling-in-transit on a parity with the millers of Houston and Galveston.

The Canadian railway commission held protracted hearings at Ottawa last week in connection with its general inquiry into freight rates in the territory west of Port Arthur. Fifty traffic men and railroad lawyers were present. Representatives of the Canadian Pacific presented statements showing that for hauls of 200 miles and more the freight rates on lines in the United States, contiguous to western Canada, were higher than on Canadian lines, though for hauls of less than 200 miles the rates in the United States were generally lower. Comparisons were also presented between rates from Pittsburgh, Pa., to western cities and those from Toronto to western Canada, showing much lower rates on the Canadian lines.

The Department of Commerce and Labor has published statements showing the amount of traffic on the Tehauntepec Railway since its opening in the year 1907. The statement does not show the tonnage of freight carried, but a rough comparison may be made by means of the statements of value which are given. The total value of freight carried both eastward and westward in 1908 by the two isthmian routes, Tehauntepec and Panama, was 36 million dollars, while in 1912 it was 125 millions. In the year ending June 30, 1912, the total value of westbound freight over the Tehauntepec lines was 55 millions, and over the Panama Railroad 14.5 millions. Eastbound last year the Tehauntepec line carried 45 million dollars' worth, and the Panama about 10 millions. Practically all of the sugar sent from Hawaii to the eastern coast of the United States goes over the Tehauntepec road.

### Eggs B. O.

The Trunk Line Association has asked a committee from the Mercantile Exchange, New York, for a conference on claims for damages on eggs delivered in that city. Claims for damages for shipments during a recent week are said to amount to 80 per cent. of the freight revenue. Out of a total of 83,190 cases received, damages are asked for on 33,050 cases. C. C. McCain, chairman of the Trunk Line Association, says that it is estimated that the amount to be claimed on the above number of damaged cases will be approximately \$22,000. The estimated freight revenue on the number of cases received during the same time is \$28,000, showing the amount of the claims to be approximately 80 per cent. of the freight revenue.

### General Review of Crop Conditions.

The department of agriculture estimates that on October 1, or at time of harvest, the composite condition of all crops was about 20 per cent. better than last year, and 10 per cent. better than in an average season.

The condition of specified crops on October 1, 1912, or at time of harvest, as compared with same time last year and with the averages of recent years (not with normal) was as follows:

1912 Compared with			1912 Compared with		
1911.	Average.		1911.	Average.	
Per Ct.	Per Ct.		Per Ct.	Per Ct.	
Apples .....	113.4	126.3	Cotton .....	97.9	103.1
Potatoes .....	136.6	111.7	Corn .....	116.8	102.2
Pears .....	107.3	110.1	Sugar beets .....	99.0	100.9
Flaxseed .....	120.4	107.6	Sorghum .....	103.7	100.4
Cranberries .....	107.2	107.2	Sweet potatoes .....	105.0	99.0
Buckwheat .....	109.6	107.1	Lemons .....	95.1	98.7
Oranges .....	104.1	105.4	Tobacco .....	101.6	98.2
Rice .....	104.4	105.2	Peanuts .....	98.9	96.3
Grapes .....	101.8	104.8	Sugar cane .....	86.1	91.5

Similarly as to production (instead of condition) of the following:

Cabbage .....	124.1	116.8	Tomatoes .....	110.9	105.2
Cloverseed .....	132.1	112.2	Broom corn .....	118.8	103.6
Onions .....	119.7	109.3	Lima beans .....	106.4	102.2
Kafir corn .....	112.6	107.9	Beans (dry) .....	105.6	101.1
Millet hay .....	120.6	107.4	Hemp .....	118.5	96.2
Millet seed .....	124.5	105.5			

The following comparisons relate to the relative yield per acre:

Oats .....	153.3	131.7	Hops .....	119.0	107.4
Spring wheat .....	183.0	128.4	Rye .....	108.3	103.7
Barley .....	141.4	119.8	Hay .....	128.9	103.5
All wheat .....	128.0	109.6	Winter wheat .....	102.0	97.4

The composite condition of all crops in each state on October 1 or at time of harvest compared with same time last year and the averages of recent years is given below:

1912 Compared with			1912 Compared with		
1911.	Average.		1911.	Average.	
Per Ct.	Per Ct.		Per Ct.	Per Ct.	
Maine .....	103	104	Missouri .....	124	103
New Hampshire .....	122	114	North Dakota .....	148	124
Vermont .....	115	113	South Dakota .....	213	108
Massachusetts .....	119	103	Nebraska .....	140	98
Rhode Island .....	111	100	Kansas .....	160	114
Connecticut .....	110	99	Kentucky .....	112	104
New York .....	117	101	Tennessee .....	99	98
New Jersey .....	115	103	Alabama .....	94	100
Pennsylvania .....	120	105	Mississippi .....	100	96
Delaware .....	113	106	Louisiana .....	101	100
Maryland .....	118	105	Texas .....	128	115
Virginia .....	110	93	Oklahoma .....	165	102
West Virginia .....	158	115	Arkansas .....	100	98
North Carolina .....	97	95	Montana .....	101	106
South Carolina .....	96	94	Wyoming .....	104	96
Georgia .....	87	92	Colorado .....	129	101
Florida .....	99	98	New Mexico .....	96	100
Ohio .....	105	99	Arizona .....	91	108
Indiana .....	107	96	Utah .....	112	100
Illinois .....	113	99	Nevada .....	100	128
Michigan .....	99	97	Idaho .....	97	105
Wisconsin .....	114	104	Washington .....	100	105
Minnesota .....	138	110	Oregon .....	113	113
Iowa .....	140	112	California .....	95	97

In the statement above the September 1 condition figures are used for oats, spring wheat and barley; the yields per acre, as reported on October 1, have overrun somewhat the yields indicated by the condition figures, which would tend to increase the above figures for some of the important oats, barley and spring wheat states, as Illinois, Minnesota, Iowa, North and South Dakota and Nebraska.

### Freight Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between railroads of the American Railway Association, in presenting herewith statistical bulletin No. 130, covering car balance and performance for June, 1912, says:

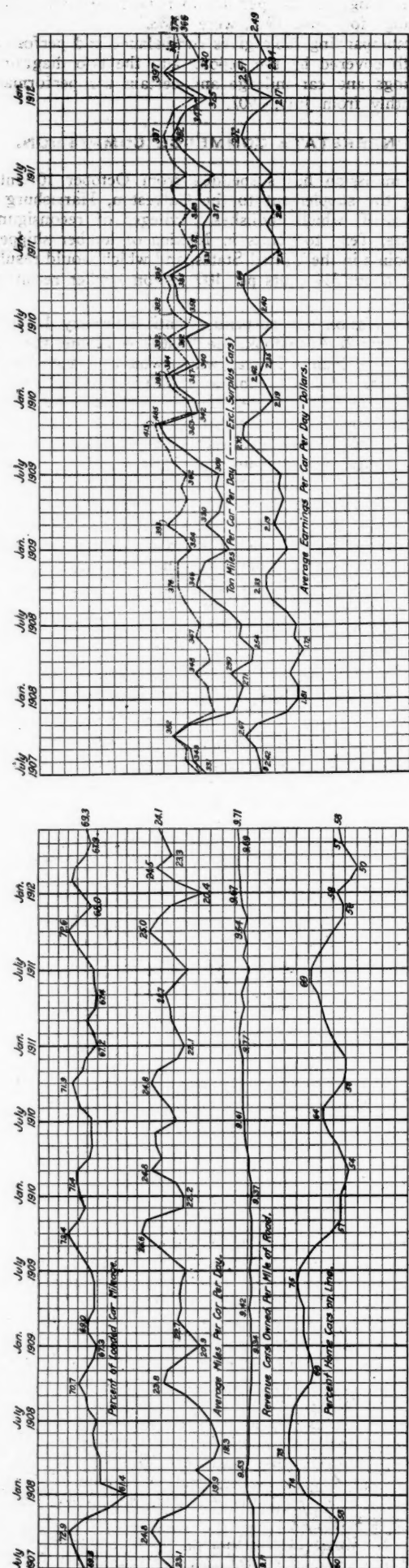
"The miles per car per day, including surplus cars, averaged 24.1, compared with 23.7 in May, and 22.9 in June, 1911. Ton miles per car per day increased from 350 in May, to 366 in June, as compared with 338 in June, 1911. The proportion of home cars on line increased from 57 per cent. in May to 58 per cent. in June, 1912, compared with 69 per cent. in June, 1911.

"There is a slight increase (1.4 per cent. in the percentage of loaded car mileage, compared with May, 1912. This figure for June, 1911, was 67.6 per cent. Compared with May, 1912, the

## FREIGHT CAR BALANCE AND PERFORMANCE IN JUNE, 1912.

	N. Y., N. J., Del., Md., Eastern Pa.	New England.	Ohio, Ind., Mich., Pa. Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned.....	85,017	85,017	216,724	190,395	174,852	400,307	17,499	141,552	27,580	142,957	116,142	2,235,289
Average number of system cars on line.....	44,248	44,248	129,325	106,240	92,129	252,162	5,439	76,606	20,794	69,367	74,476	1,166,761
Railway-owned cars: Average foreign on line.....	43,026	43,026	101,209	66,627	60,616	146,994	11,210	50,853	22,012	54,910	59,529	796,583
Total Railway-owned cars on line.....	95,187	95,187	230,534	172,867	152,745	399,156	16,649	127,459	42,806	124,277	134,005	1,971,237
Excess.....	10,170	10,170	13,810	*17,528	*22,107	*1,151	*850	*14,093	15,226	*18,680	*17,863	*43,483
Per cent. of cars on line to total owned:												
Home.....	52	52	59	56	53	63	31	54	75	43	64	58
Foreign.....	51	51	36	35	34	37	64	32	80	37	51	39
All railways.....	103	103	95	91	87	100	95	86	155	80	115	97
Private cars on line.....	3,971	3,971	12,194	3,798	8,281	15,926	1,455	9,232	4,812	13,327	3,335	107,324
Total, all cars on line.....	99,158	99,158	242,728	176,665	161,026	415,082	18,104	136,691	47,618	137,604	137,340	2,078,561
Per cent. of cars in shop.....	7.00	7.00	8.02	7.66	10.90	7.94	7.52	8.98	6.98	5.79	5.37	7.79
No. of freight engines owned.....	1,420	1,420	3,068	3,323	2,841	6,429	525	2,732	760	3,091	2,025	37,223
Average cars on line per freight engine owned.....	70	70	79	53	57	65	34	50	63	41	68	61
Total freight-car mileage.....	55,001,206	55,001,206	161,737,628	133,564,394	124,376,943	291,081,783	22,915,683	90,963,579	28,333,590	124,466,071	103,437,360	1,561,677,264
Average mileage per car per day.....	18.5	18.5	23.7	23.0	25.8	22.7	43.4	24.0	19.8	30.1	25.1	24.1
Per cent. loaded mileage.....	74.1	74.1	67.2	65.6	70.1	70.6	77.0	69.8	66.3	71.3	75.3	69.3
Ton-miles of freight, including company freight.....	622,018,420	622,018,420	2,871,817,633	2,105,260,882	1,710,583,523	2,978,288,395	370,255,940	971,168,114	312,712,428	1,711,695,203	1,456,578,540	23,618,391,311
Average ton-miles, including company freight:												
Per car-mile.....	11.3	11.3	17.2	15.8	13.8	13.5	16.6	13.6	11.0	14.0	14.1	15.2
Per loaded car-mile.....	15.3	15.3	25.9	24.0	19.7	19.6	21.4	19.8	16.6	19.6	18.2	21.8
Per car per day.....	209	209	407	397	356	306	720	328	219	420	354	366
Gross freight earnings.....	\$6,923,225	\$6,923,225	\$15,058,240	\$11,571,453	\$11,137,645	\$29,168,049	\$2,596,401	\$10,205,429	\$2,737,165	\$17,285,310	\$10,381,113	\$168,239,608
Average daily earnings: Per car owned.....	\$2.46	\$2.46	\$2.32	\$2.03	\$2.12	\$2.43	\$4.95	\$2.32	\$3.31	\$3.59	\$2.98	\$2.56
Per railroad car on line.....	2.39	2.39	2.18	2.23	2.67	2.44	2.50	2.67	2.44	4.65	2.13	2.62
All cars on line.....	2.31	2.31	2.07	2.18	2.31	2.34	4.78	2.49	1.92	4.20	2.52	2.49

\* Denotes deficiency.



Freight Car Performance, 1907 to 1912.

Freight Car Mileage and Earnings, 1907 to 1912.

average earnings per car per day increased .10 cents. The average earnings for June, 1911, were \$2.38."

The accompanying table gives car balance and performance in the month covered by the report, and the two diagrams show car earnings and car mileage and certain car performance figures monthly from July, 1907.

#### INTERSTATE COMMERCE COMMISSION.

The commission has suspended from October 10 until February 13, the supplement to the Galveston, Harrisburg & San Antonio tariff, which abolishes privileges of reconsignment at Eagle Pass, Tex., to points in Mexico of lumber shipped from various points in the United States, and which would result in advances of about 3½ cents per 100 lbs. on lumber reconsigned at that point.

The commission has suspended until February 12 the tariffs of the Bangor & Aroostook, the Boston & Maine, the Canadian Pacific and the Maine Central, which would advance by amounts ranging from 2/3 of a cent to 1 1/6 cents per 100 lbs., the charges for the use of heater cars in connection with shipments of potatoes, apples and other perishable freight; and the minimum charge per car by amounts ranging from \$2 to \$4.20. The proposed tariffs make certain other changes which would result in advances in the charge for this service.

#### A Point of Law Settled.

The Interstate Commerce Commission has issued an informal statement reviewing a recent suit in the United States Court for the Southern district of New York, which says, in part: Judge Mayer, on October 5, imposed a sentence of twenty-four hours' imprisonment and \$1,500 fine on Harold R. Wakem, a member of the firm of Wakem & McLaughlin, commission and forwarding merchants. Wakem received certain commission payments on shipments carried by the Chesapeake & Ohio. The pretense was that he had, as import agent, solicited the business and that the payment was in the nature of compensation to a railroad employee. As a matter of fact, the routing of these shipments was controlled by Wakem. The Government, therefore, took the position that the payments instead of being regarded as compensation for services rendered to the railroad company must be regarded as payments for routing; that is to say, as rebates. The case also further establishes that a person cannot be at the same time an agent of the shipper in control of routing and also an agent of the carrier to solicit such business. These questions of law have been repeatedly brought to test in prosecutions by the commission, always with the same result. This case thus further emphasizes doctrines which a number of carriers and shippers have been reluctant to recognize. An employee of the carrier in question pleaded guilty of giving these rebates some days ago and was sentenced to a fine of \$15,000.

#### The Express Investigation.

The commission has denied the application of the railroad carriers for permission to intervene in this case. The commission will itself make tariffs of rates, and after these are completed the express companies will be given 30 days in which to make an estimate of the effect of the changes on the actual business of a specified period in the past, and to report such estimate to the commission. The railroads pointed out that their own threatened loss of revenue, coming on top of staggering increases in operating expenses, made it of the utmost importance to them that their voice should be heard in the case; but the counsel for the commission replied that the railroads ought to have intervened long ago.

The contention of the express companies was that the rates fixed by the commission through its zone system were so low that they could not operate except at a loss; and so the commission has compromised the matter by taking upon itself the task of formulating tariffs.

The opinion is expressed by the commission that it will be impossible to make new express rates effective before early next spring. During the fiscal year 1911 the thirteen express companies had a gross transportation income of \$149,311,485, out of which they paid the railroads \$73,956,455, leaving for themselves \$75,355,030.

Walker D. Hines at the hearing at Washington, October 12, presented the reasons of the express companies for objecting

to the reductions proposed by the commission. He estimated that the five largest express companies would lose \$27,000,000 a year, about one-half of which loss would fall upon the railroads. This estimate, which did not include intrastate business, was made by calculating the losses on the business of one day. At the same time it was not certain that the estimate was large enough, as it had been impossible, with the formulas furnished by the commission, to calculate all of the losses. When Mr. Hines complained at certain features of the graduated scale of rates, Commissioner Lane replied that the contracts of the express companies with the railroads were largely to blame for unsatisfactory conditions. He said that on small packages the express company retained for itself less than the cost of the service, while, on the other hand, shipments of fruit, in carloads, shipped by express from California to eastern cities laid practically no burden whatever on the express companies, the whole service being performed by the railroad, yet the express company had its customary 50 per cent. of the gross receipts. Mr. Hines told the commission that he had analyzed the rates prescribed in the new law providing for a parcel post, and was satisfied that the post office would take away from the express companies the business in small packages for short distances. He said he estimated that the proposed express rates of the commission are higher than the parcels post rates on 7 lbs. for distances up to about 29 miles, on 6 lbs. up to 100 miles and on 4 lbs. up to 350 miles.

#### STATE COMMISSIONS.

The railroad commission of Louisiana has issued a circular to railways and shippers of the state asking their co-operation in promoting the movement of freight cars, and suggesting ways in which the greatest efficiency can be obtained from available equipment.

The railroad commission of Louisiana has made an order that when freight cars are loaded to their physical capacity with any article for which a carload rating is provided, no more than the actual weight of the shipment contained in such cars shall be charged for.

Representatives of five short lines in Minnesota appeared before the Minnesota railway commission at St. Paul on October 12, to ask exemption from the joint rate rule promulgated by the commission about two months ago requiring that when shipments are made over two or more roads a joint rate shall be made based upon 80 per cent. of the local rates.

The Public Utilities Commission of Ohio has called upon the railroads carrying coal to show cause why the collection of demurrage on coal cars should not be resumed after the present month. When a strike was threatened in the coal mines last winter the commission allowed the railroads to discontinue the collection of demurrage on cars used for the storage of coal; and it is now proposed to recall this order.

#### COURT NEWS.

The Aransas Harbor Terminal Railway has filed in the district court at San Antonio, Tex., a petition for an injunction to restrain eight Texas trunk lines from continuing to practice alleged discrimination against Port Aransas by the refusal to issue through bills of lading. It is charged that shipments are made under local bills of lading in order to escape the operation of the interstate commerce law.

The United States Commerce Court has denied the motion of the Southern Railway and other companies for a preliminary injunction against the enforcement of the order of the Interstate Commerce Commission in the case of the Chamber of Commerce of Newport News, which protested against the charging of higher rates on freight between Newport News, Va., and points in certain prescribed territory, than between Norfolk, Va., and the same points.

The Supreme Court of New Jersey has sustained the order of the Public Utilities Commission of that state requiring those railroads which furnish drinking water for passengers to also provide drinking utensils. Justice Minturn, who handed down the decision, said that the railroads themselves had put a reasonable construction on the question of supplying water, and that, having supplied the water, to furnish no utensils was like running a dining car without forks, knives or spoons.

## REVENUES AND EXPENSES OF RAILWAYS.

TWO MONTHS OF FISCAL YEAR, 1913—(CONTINUED FROM PAGE 703.)

Name of road.	Mileage operated at end of period.	Operating revenues				Operating expenses				Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decrease) comp. with last year.
		Freight.	Passenger.	inc. misc.	Total.	Way and structures.	Maintenance of equipment.	Traffic.	Trans- portation.					
Long Island	399	\$578,491	\$1,902,111	\$2,581,780	\$5,062,382	\$97,134	\$250,602	\$30,458	\$69,677	\$45,151	\$1,433,022	\$12,978	\$536,104	\$2,675
Louisiana & Arkansas	255	230,591	42,920	284,511	738,781	70,168	38,877	126,642	210,636	89,274	3,821,592	9,563	1,574,389	268,750
Louisiana Ry. & Navigation	351	242,408	55,202	297,610	644,220	70,168	38,877	5,348	39,692	10,410	201,474	324	29,080	9,993
Louisville & Nashville	4,714 <sup>30</sup>	6,537,412	2,293,179	9,304,128	18,134,719	372,449	1,885,509	212,175	601,466	40,232	1,075,594	485,933	428,951	136,800
Louisville, Henderson & St. Louis	200	1,144,819	67,976	196,128	4,768,797	679,349	1,278,879	105,148	1,422,359	95,151	2,922,306	42,795	1,619,545	112,255
Maine Central	1,204 <sup>31</sup>	1,095,418	818,182	2,036,000	3,939,600	397,134	735,601	122,493	1,748,175	147,014	3,587,992	10,045	1,165,091	528,594
Michigan Central	1,817 <sup>32</sup>	3,322,862	1,756,357	5,079,219	9,158,438	713,239	1,885,819	116,678	2,743,305	129,790	3,776,761	5,749	1,046,915	799,548
Midland Valley	373	149,085	79,574	241,166	469,725	106,168	38,877	5,348	39,692	10,410	201,474	324	29,080	9,993
Minneapolis & St. Louis	1,586	1,096,219	372,449	1,568,668	3,037,326	188,509	735,601	122,493	1,748,175	147,014	3,587,992	10,045	1,165,091	528,594
Missouri, Kansas & Texas System	3,398	3,220,531	1,278,879	4,768,797	8,998,820	679,349	1,885,819	116,678	2,743,305	129,790	3,776,761	5,749	1,046,915	799,548
Missouri Pacific	3,920 <sup>33</sup>	3,682,797	969,808	5,016,205	9,668,810	785,819	1,885,819	116,678	2,743,305	129,790	3,776,761	5,749	1,046,915	799,548
Mobile & Ohio	1,114	1,579,340	266,574	1,950,928	3,806,638	237,146	369,033	75,365	702,938	57,883	1,442,367	2,494	446,349	36,949
Monongahela	65	250,668	4,767	255,435	511,570	4,767	20,001	705	49,296	3,924	118,180	4,000	136,162	49,512
Nashville, Chattanooga & St. Louis	1,231 <sup>34</sup>	1,434,689	569,584	2,142,492	4,146,765	325,286	402,916	77,631	806,775	55,497	1,668,085	1,029	422,546	1,261
Nevada Northern	165	264,413	28,630	293,043	582,083	34,691	28,919	785	59,136	7,095	130,616	12,571	156,587	34,282
New Orleans & North Eastern	196	451,713	110,927	562,640	1,125,280	114,455	114,455	20,104	237,319	22,441	475,598	146	105,583	26,721
New Orleans Great Western	283	215,467	64,551	280,018	569,535	43,905	33,307	4,632	85,289	14,387	181,720	109	114,360	16,500
New York Central & Hudson River	3,598 <sup>35</sup>	10,508,631	6,734,458	19,212,427	35,455,516	2,635,419	3,463,303	384,440	6,359,104	436,224	13,268,550	1,049,003	4,531,309	443,985
New York, New Haven & Hartford	2,090	5,892,930	5,253,762	12,146,692	25,293,384	1,271,601	1,324,695	54,854	4,133,864	321,461	7,106,475	247,378	636,000	974,245
New York, Ontario & Western	566	1,285,036	625,623	2,000,659	4,290,318	226,741	244,834	24,365	591,375	34,187	1,121,502	1,631	845,460	198,106
New York, Philadelphia & Norfolk	112	538,785	107,625	697,836	1,344,246	53,586	106,269	8,457	275,670	25,189	469,171	228,665	212,865	36,644
Norfolk & Western	2,018 <sup>36</sup>	6,318,509	906,678	7,454,672	15,688,859	1,066,167	1,326,187	107,787	2,009,512	129,085	4,638,731	7,661	2,568,280	321,391
Norfolk Southern	608	325,102	201,671	585,819	1,212,592	72,136	78,820	13,046	194,229	48,031	386,862	5,220	16,666	177,071
Northern Central	473 <sup>37</sup>	1,584,885	459,160	2,180,706	4,824,951	295,663	414,092	34,230	985,280	48,031	1,777,296	2,028	328,038	105,124
Northern Pacific	6,233 <sup>38</sup>	7,830,748	1,981,664	11,785,904	26,900,300	1,904,028	1,492,217	211,583	3,576,238	160,877	7,349,943	99,419	3,928,000	158,640
Northwestern Pacific	401 <sup>39</sup>	270,571	493,737	808,304	1,574,612	99,180	78,298	8,777	242,336	20,548	449,129	25,158	334,017	28,840
Oregon Short Line	1,762 <sup>40</sup>	2,642,329	1,014,966	3,860,650	7,518,945	369,427	378,649	57,616	833,244	73,731	1,732,717	212,333	1,896,053	295,872
Oregon-Washington R. R. & Nav. Co.	1,920 <sup>41</sup>	1,912,109	1,014,994	3,117,639	6,046,742	357,560	312,673	86,119	1,045,777	86,136	1,888,265	5,604	1,065,494	59,253
Pecos & Northern Texas	479 <sup>42</sup>	286,057	95,666	400,988	781,710	57,837	88,218	6,774	121,412	12,631	286,872	11,251	102,865	34,529
Pennsylvania Co.	1,751 <sup>43</sup>	9,276,274	1,832,652	12,222,658	23,331,584	1,632,581	1,994,796	136,672	3,745,012	185,731	7,976,782	3,972	4,435,876	908,244
Pennsylvania Railroad	4,021 <sup>44</sup>	21,741,370	6,810,072	30,463,797	68,115,239	3,840,499	5,905,919	368,179	10,098,004	666,506	20,760,107	152,882	8,228,928	1,671,297
Peoria & Eastern	352	438,811	127,432	604,343	1,271,586	82,161	81,902	8,418	205,438	11,148	389,067	19,600	195,674	65,213
Pere Marquette	2,330 <sup>45</sup>	1,766,778	934,678	2,951,119	6,767,628	591,583	643,294	54,608	1,236,887	43,868	2,805,297	9,929	1,065,494	59,253
Philadelphia, Baltimore & Washington	713	1,941,645	1,425,169	3,366,814	6,767,628	591,583	643,294	54,608	1,236,887	43,868	2,805,297	9,929	1,065,494	59,253
Pittsburgh & Lake Erie	221 <sup>46</sup>	2,993,523	319,937	3,313,460	7,626,410	335,846	496,053	25,683	673,905	49,438	1,580,925	374	793,222	104,354
Pittsburgh, Cincinnati, & St. Louis	1,467	5,277,226	1,511,661	6,788,887	15,597,834	434,663	1,381,475	142,771	2,512,062	136,898	5,216,869	702	2,028,078	314,598
Pittsburgh, Shawmut & Norfolk	279 <sup>47</sup>	240,408	22,143	262,551	524,701	41,240	65,696	2,428	76,899	7,965	194,228	69,791	69,791	5,704
Richmond, Fredericksburg & Potomac	83	258,667	139,625	455,843	854,135	56,378	56,378	5,721	151,947	11,738	280,892	1,428	178,310	44,204
Rutland	468	349,508	247,473	686,981	1,583,962	72,163	119,582	18,140	247,517	11,882	469,284	216,197	188,310	37,705
St. Joseph & Grand Island	319	201,839	81,313	307,540	596,692	50,698	38,550	6,530	104,161	10,091	231,561	635	127,992	6,002
St. Louis & San Francisco	4,742 <sup>48</sup>	4,582,040	1,968,064	7,000,852	15,549,956	91,678	1,022,550	182,325	2,470,134	204,800	4,760,327	33,497	1,924,318	53,211
St. Louis, Brownsville & Mexico	510	273,999	148,418	450,974	827,417	82,277	42,259	10,274	202,429	17,238	353,477	97,497	86,497	21,874
St. Louis, Iron Mountain & Southern	3,318 <sup>49</sup>	4,277,173	1,101,563	5,780,631	12,939,367	107,669	900,099	110,856	1,791,956	136,500	4,018,073	10,600	1,570,366	516,030
St. Louis Merchants' Bridge Terminal	9	326,625	55,969	382,594	869,184	10,285	10,285	1,232	160,748	10,759	238,993	87,632	75,432	58,152
St. Louis, San Francisco & Texas	244	1,627,769	60,222	2,368,802	4,056,793	6,023	31,481	6,023	95,975	10,302	188,622	2,433	45,747	38,509
St. Louis Southwestern of Texas	906 <sup>50</sup>	1,005,775	259,724	1,322,285	2,947,834	156,627	199,099	52,317	332,201	48,788	789,032	1,292	48,845	64,791
St. Louis Southwestern of Texas	703	584,209	207,390	837,485	1,629,089	133,992	149,270	21,727	309,611	35,294	649,894	400	166,591	129,280
St. Louis, Los Angeles & Salt Lake	1,135 <sup>51</sup>	986,830	560,727	1,664,053	3,191,380	176,304	273,728	60,845	504,510	38,926	1,054,313	3,828	542,162	360,360
Seaboard	3,070 <sup>52</sup>	2,242,230	895,434	3,514,116	7,660,780	542,534	513,152	125,838	1,286,151	99,607	2,567,282	4,850	779,984	15,417
Southern	7,034 <sup>53</sup>	6,860,506	3,414,362	11,096,203	24,352,961	1,457,262	1,892,272	326,733	3,670,355	314,286	7,660,908	3,220	3,027,256	139,669
Southern Kansas of Texas	281	80,520	54,787	150,038	295,335	5,101	69,005	4,373	137,044	7,693	157,044	13,523	20,529	30,335
Southern Pacific	125	176,530	39,905	225,476	485,911	18,178	48,905	4,373	70,014	7,372	148,842	5,143	71,491	18,009</

## Railway Officers.

### ELECTIONS AND APPOINTMENTS.

#### Executive, Financial and Legal Officers.

A. L. Lathrop has been appointed assistant to the vice-president of the Mexico North Western, with headquarters at El Paso, Tex.

George W. Lamb has been appointed second assistant comptroller of the Louisville & Nashville, with headquarters at Louisville, Ky.

Arthur Holland, of Concord, Mass., has been elected president of the Bangor & Aroostook, succeeding Franklin W. Cram, resigned.

J. F. Waddell has been appointed auditor for the receivers of the Denver, Laramie & Northwestern, with headquarters at Denver, Colo., to succeed A. F. Dodd, resigned.

J. M. Gruber, general manager, and W. P. Kenney, general traffic manager, of the Great Northern, with headquarters at St. Paul, Minn., have been elected vice-presidents of that company.

J. M. Fitzgerald has been elected vice-president of the Western Maryland, with headquarters at Baltimore, Md., and J. T. Hendricks, freight traffic manager at Baltimore, has been elected vice-president in charge of traffic.

E. J. Chamberlin, president of the Grand Trunk and the Grand Trunk Pacific, with headquarters at Montreal, Que., has been elected president also of the Grand Trunk Western and other Michigan subsidiary companies of the Grand Trunk, succeeding the late C. M. Hays.

George Ziegler, comptroller of the Philadelphia & Reading, at Philadelphia, Pa., has been elected secretary, succeeding W. R. Taylor, resigned. Mr. Taylor has resigned also as vice-president and secretary of the Reading Company. J. V. Hare, chief clerk to Mr. Taylor has been appointed to the new position of assistant secretary of the Philadelphia & Reading, and succeeds Mr. Taylor as secretary of the Reading Company.

#### Operating Officers.

E. H. Baker has been appointed trainmaster of the Illinois Central, with headquarters at Champaign, Ill., in place of W. E. Knox.

W. J. Hogan has been appointed master of transportation of the Grand Trunk, with office at Durand, Mich., succeeding G. W. Gillespie, transferred.

T. C. Dougherty has been appointed trainmaster of the Chicago, Burlington & Quincy, with office at Ottumwa, Ia., to succeed N. C. Allen, promoted.

C. G. Elliott has been appointed assistant to general manager of the Missouri, Kansas & Texas Railway System and the Texas Central, with headquarters at Dallas, Tex.

A. S. Johnson has been appointed superintendent of the Missouri, Kansas & Texas of Texas, with headquarters at Denison, Tex., succeeding H. F. Anderson, promoted.

F. R. Blunt has been appointed superintendent of the Missouri, Kansas & Texas of Texas, with headquarters at Smithville, Tex., in place of C. J. Brown, resigned.

G. H. Emerson, assistant general manager of the Great Northern, has been appointed general manager, with headquarters at St. Paul, Minn., to succeed J. M. Gruber, promoted.

B. L. Bugg, traffic manager of the Atlanta, Birmingham & Atlantic, at Atlanta, Ga., has been appointed assistant general manager, with office at Atlanta, succeeding W. R. Hudson, resigned to accept service elsewhere.

Walter S. Williams has been appointed superintendent of the Minnesota division of the Illinois Central, with office at Dubuque, Iowa, succeeding Timothy H. Sullivan, who has been appointed superintendent of the Springfield division, with office at Clinton, Ill., succeeding Walter S. Williams.

D. Van Hecke, trainmaster of the El Paso division of the Chicago, Rock Island & Pacific, has been appointed train-

master, with headquarters at Haileyville, Okla., succeeding H. F. Reddig, promoted. H. J. Sewell has been appointed trainmaster of the Panhandle division, with office at El Reno, Okla., in place of F. G. Weeks, assigned to other duties.

H. C. Ferris, general manager of the Mexico North Western at Ciudad Juarez, Chih., Mexico, having resigned, that position has been abolished. J. J. Pruett has been appointed general superintendent, with headquarters at Ciudad Juarez, Chihuahua. M. J. Gilmartin has been appointed superintendent of the El Paso division, with headquarters at Pearson, Chih., Mexico. M. L. Masteller has been appointed superintendent of the Chihuahua division, with headquarters at Madera, Chih., Mexico, and F. C. Herr has been appointed superintendent of terminals, with headquarters at Ciudad Juarez.

L. J. Ferritor, superintendent of the Northern and Southern divisions of the Chicago & Alton, with headquarters at Bloomington, Ill., has resigned. C. W. Miller, trainmaster of the Cleveland division of the Wheeling & Lake Erie, at Canton, Ohio, has been appointed superintendent of the Southern division of the C. & A., with headquarters at Bloomington, and S. P. Henderson, trainmaster of the Bloomington-Chicago district of the Chicago & Alton, at Bloomington, has been appointed superintendent of the Northern division, with headquarters at Bloomington. James Butler, road foreman of engines of the Bloomington-Chicago district, has been appointed trainmaster of the same territory, succeeding Mr. Henderson.

William F. Ray, whose appointment as general superintendent of the Boston & Maine, with office at Boston, Mass., has been announced in these columns, was born in 1857 at South Vernon, Vt. He was educated at Ft. Wayne and at the University of Notre Dame, South Bend, Ind., and began railway work as locomotive fireman in 1874 on the Connecticut River Railroad, now a part of the Boston & Maine, and later held various positions in the freight train service, including that of brakeman and conductor, and then entered the passenger train service as conductor. He was then appointed trainmaster, and was later assistant superintendent. In 1903 he was made superintendent of the Concord division of the Boston & Maine, and in October, 1911, was transferred as superintendent to the Portland division, which position he held at the time of his recent appointment as general superintendent of the same road.

#### Traffic Officers.

J. L. Bacon has been appointed soliciting agent of the Central of Georgia, with office at Albany, Ga., succeeding W. C. Quillian, resigned.

C. T. Collett has been appointed traveling passenger and freight agent of the Houston & Texas Central, with office at Oklahoma City, Okla.

Gaylord Warner has been appointed assistant general passenger agent of the Chicago, Rock Island & Pacific, with office at Minneapolis, Minn.

W. W. Croxton, general passenger agent of the Norfolk Southern, at Norfolk, Va., has been appointed also acting general freight agent, with headquarters at Norfolk.

J. R. Veitch, assistant general freight agent of the Chicago, Milwaukee & Puget Sound, with office at Seattle, Wash., has been appointed assistant traffic manager, with headquarters at Chicago, succeeding S. M. Earling, resigned.

Theodore Doty has been appointed commercial agent of the Norfolk & Western, with office at Portsmouth, Ohio. H. C. Montgomery, soliciting freight agent at Mobile, Ala., has been appointed commercial agent, with office at Little Rock, Ark., succeeding Chas. E. Heaney, resigned to engage in other business. A. P. Smith succeeds Mr. Montgomery, and R. M. Taliaferro has been appointed general agent, with office at Lynchburg, Va., succeeding S. B. Younger, deceased.

#### Engineering and Rolling Stock Officers.

George P. Kempf has been appointed engineer of tests of the Chicago, Milwaukee & St. Paul, succeeding R. H. Morrison, resigned.

G. H. Bussing has been appointed superintendent of motive power of the Mexico North Western, with headquarters at Madera, Chih., Mexico.

T. Winkel has been appointed master mechanic of the Gulf division of the International & Great Northern, with headquarters at Palestine, Tex.

D. C. Day has been appointed supervisor of signals of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Galion, Ohio, succeeding T. E. Lutz.

J. H. Bender has been appointed master mechanic for the receivers of the Denver, Laramie & Northwestern, with headquarters at Utah Junction (Denver), Colo., to succeed E. Nedro, resigned.

R. L. Gebhardt, engineer of the Auburn division of the Lehigh Valley at Auburn, N. Y., has been appointed engineer of the New Jersey and Lehigh division, with office at Easton, Pa., succeeding R. A. Van Houten, resigned to go into other business.

J. H. Reinholdt, roadmaster on the Western division of the Minneapolis & St. Louis, at Watertown, S. Dak., has been appointed principal assistant engineer, with headquarters at Minneapolis, Minn., and J. B. Kelly, roadmaster on the Central division, at Minneapolis, has had his jurisdiction extended over the Western division.

C. N. Kalk, who recently was appointed chief engineer of the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Minneapolis, Minn., was born June 29, 1860, at Fond du Lac, Wis. He was educated at the University of Wisconsin, and began railway work in 1881 with the Northern Pacific, with which road he remained until 1883 as chairman, instrument man and division engineer. He was then in private business for several years, re-entering railway service in 1887 as resident engineer for the Minneapolis, St. Paul & Sault Ste. Marie, in charge of construction. From 1890 to 1892 he was locating engineer for the Wisconsin Central, and the following year engaged in private work, returning to the Wisconsin Central in 1893 as principal assistant engineer. In 1902 he was made chief engineer, and in 1909 became principal assistant engineer of the Minneapolis, St. Paul & Sault Ste. Marie, from which position he was promoted to chief engineer on October 1.

W. L. Robinson, road foreman of engines of the Baltimore division of the Baltimore & Ohio, at Baltimore, Md., has been promoted to supervisor of fuel consumption. E. C. Shipley succeeds Mr. Robinson as road foreman of engines at Baltimore. As supervisor of fuel consumption, Mr. Robinson's efforts will be directed towards locomotive efficiency as well as economy in the use of fuel. He will instruct firemen on all classes of engines in scientific firing with a view to obtaining their co-operation in securing the greatest heat unit out of the coal burned. Mr. Robinson was formerly a member of the General Safety Committee, as a representative of the mechanical department when the safety campaign was begun on the Baltimore & Ohio about two years ago. After graduation from Purdue University as a mechanical engineer, he entered the service of the Baltimore & Ohio as a special mechanic. He was then roundhouse foreman at Garrett, Ind., and later was made special inspector of the mechanical department, remaining in that position until his promotion to road foreman of engines at Baltimore, which position he held at the time of his appointment as supervisor of fuel consumption on the same road.

#### OBITUARY.

Robert Toombs, auditor of the Minneapolis, St. Paul & Sault Ste. Marie, died suddenly on October 10, at Minneapolis, Minn., aged 53 years.

Adrian Hoffman Joline, formerly chairman of the board of the Missouri, Kansas & Texas, died at his home in New York on October 15. He was born on June 30, 1850, at Sing Sing, N. Y., and graduated from Princeton University in 1870. Two years later he graduated from Columbia College Law School. In 1900 he became general counsel of the Toledo, St. Louis & Western, and in 1905 was counsel and director of the Missouri, Kansas & Texas. The following year he became chairman of the board of the M. K. & T., and in 1907 was elected president also of that company and president of the Missouri, Kansas & Texas of Texas. At various times he had been receiver of several railways previous to his appointment in 1907 as receiver of the Metropolitan Street Railway, of New York City.

## Equipment and Supplies.

### LOCOMOTIVE BUILDING.

THE KETTLE RIVER is making inquiries for 1 locomotive.

THE MAINE CENTRAL is making inquiries for 8 locomotives.

THE CERRO DE PASCO, Chile, is making inquiries for 2 locomotives.

THE MOBILE & OHIO has ordered 1 mikado locomotive from the Baldwin Locomotive Works.

THE LONG ISLAND is making inquiries for 4 freight locomotives and 2 switching locomotives.

THE WASHINGTON SOUTHERN has ordered 5 Pacific type locomotives from the Baldwin Locomotive Works.

THE MISSOURI, KANSAS & TEXAS has ordered 40 mikado locomotives from the American Locomotive Company.

THE ELGIN, JOLIET & EASTERN has ordered 20 mikado locomotives from the American Locomotive Company.

THE KANSAS CITY SOUTHERN has exercised an old option for locomotives with the American Locomotive Company.

THE LOUISVILLE, HENDERSON & ST. LOUIS has ordered 3 ten-wheel locomotives from the Baldwin Locomotive Works.

THE NORTHERN PACIFIC has ordered 50 mikado locomotives and 10 Mallet locomotives from the American Locomotive Company.

THE LEHIGH & NEW ENGLAND has ordered 5 consolidation locomotives and 1 eight-wheel switching locomotive from the Baldwin Locomotive Works.

THE RICHMOND, FREDERICKSBURG & POTOMAC has ordered 5 Pacific type locomotives from the American Locomotive Company. These locomotives will be equipped with superheaters, will have 22 in. x 28 in. cylinders, 73 in. driving wheels, and in working order will weigh 241,000 lbs.

THE LEHIGH & NEW ENGLAND has ordered 5 consolidation locomotives and 1 eight-wheel switching locomotive from the Baldwin Locomotive Works. The consolidation locomotives in working order will weigh 143,000 lbs., and will have a tractive power of 31,900 lbs. The switching locomotive in working order will weigh 178,000 lbs., and will have a tractive power of 39,000 lbs.

THE ATLANTA & WEST POINT has ordered 1 ten-wheel locomotive and 1 six-wheel switching locomotive from the American Locomotive Company. The ten-wheel locomotive will have 21 in. x 28 in. cylinders, 61 in. driving wheels, and in working order will weigh 189,000 lbs. The switching locomotive will have 19 in. x 24 in. cylinders, 52 in. driving wheels, and in working order will weigh 119,000 lbs.

### CAR BUILDING.

THE NORFOLK & WESTERN is considering the purchase of about 5,000 freight cars.

THE CHICAGO, BURLINGTON & QUINCY has ordered 500 flat cars from the Haskell & Barker Car Company.

THE CENTRAL OF BRAZIL has ordered 300 freight cars from the American Car & Foundry Company, and 60 freight cars from the Standard Steel Car Company.

THE PHILADELPHIA & READING has ordered 1,000 hopper cars from the Cambria Steel Company and 1,500 hopper cars from the American Car & Foundry Company.

THE NEW YORK CENTRAL & HUDSON RIVER has ordered 25 passenger cars from the Pressed Steel Car Company, and is in the market for 40 baggage cars and 25 coaches.

THE LONG ISLAND has ordered 15 motor coaches, 15 combination motor passenger cars, and 4 postal cars from the American Car & Foundry Company.

THE KANSAS CITY SOUTHERN has ordered 1,000 gondola cars from the American Car & Foundry Company, 200 flat cars from

the Bettendorf Axle Company and 100 automobile cars from the Mount Vernon Car & Manufacturing Company.

THE LEHIGH & NEW ENGLAND has ordered 250 box cars from the American Car & Foundry Company, 250 box cars from the Standard Steel Car Company, and 100 hopper cars from the Cambria Steel Company. The capacity of the box cars will be 30 tons; and the general dimensions will be as follows: Length over striking plates, 38 ft. 2 1/8 in.; length inside, 36 ft.; width inside, 8 ft. 6 in.; height from floor to roof, 8 ft. 1/2 in.; height at running board, 13 ft. 2 1/8 in.; total wheel base, 31 ft. 10 in.; truck wheel base, 5 ft. 4 in. The special equipment will be as follows:

Air brake—Westinghouse.	Draft gear—Miner.
Bolsters—Gould.	Journal boxes—Gould.
Brake beams—Davis.	Journal bearings—Ajax.
Brake shoes—American Brake	Roofs—Hutchins.
Shoe & Foundry Co.	Springs—Union Spring & Manu-
Couplers—Divided equally between	facturing Co.
Gould and Simplex.	

The capacity of the hopper cars will be 50 tons and the same specialties will be used as on the box cars except:

Couplers—Sharon.	Journal boxes—Symington.
Draft gear—Farlow.	

### IRON AND STEEL.

THE PERE MARQUETTE has ordered 15,000 tons of rails from the Illinois Steel Company.

THE LOUISVILLE & NASHVILLE has ordered 90,000 tons of rails, including 20,000 tons of seconds from the Tennessee Coal, Iron & Railroad Company.

THE PENNSYLVANIA RAILROAD, mentioned in the *Railway Age Gazette* of October 4, as having ordered 125,000 tons of rails, has ordered 50,000 tons of rails from the United States Steel Corporation, 30,000 tons from the Pennsylvania Steel Company, 30,000 tons from the Cambria Steel Company, 10,000 tons from the Bethlehem Steel Company and 10,000 tons from the Lackawanna Steel Company. This makes a total of 130,000 tons.

GENERAL CONDITIONS IN STEEL.—The conditions in the steel market are most satisfactory. Orders continue to come in at the same high rate and the steel companies are experiencing difficulty in obtaining raw material in time to fulfill contracts. The railroads have been buying heavily and some large orders are still pending. Prices have been increased on a number of different products and it is probable that there will be further increases in the near future. The mills are operating at the maximum capacity possible and unfilled orders on the books of the companies are sufficient to keep the mills operating at a high rate of capacity through the first six months of 1913.

### SIGNALING.

*New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.*

THE CENTRAL OF GEORGIA has ordered from the Western Electric Company apparatus for the equipment of 180 miles of its lines with a telephone train despatching line. This is the third extensive installation made by this road.

THE ATCHISON, TOPEKA & SANTA FE in the near future will install automatic block signals, operated and controlled by alternating current, on the double track between Rio Puerco and Suwanee, N. M.; Seligman and Rampai, Ariz.; McCarty and Horce, N. M.; Crookton and Seligman, Ariz.; Keenbrook and San Bernardino, Cal.; and Holiday and Olathe, Kan. These installations comprise 85 miles of double track signaling, and make a total of 218 miles of double-track automatic block signals which the Santa Fe has now authorized and under construction. Three-phase, 25-cycle, 4,400-volt alternating current will be used on the transmission system.

CAR FERRY FOR ARGENTINA.—A Glasgow, Scotland, firm has recently turned out a car ferryboat to cross the Parana river on the route of the Northeastern Argentine Railway, between Posadas, in the province of Misiones, and the shore of Paraguay opposite, about two miles. The river heretofore has been the sole outlet of Paraguay.

## Supply Trade News.

The National Tube Company, Pittsburgh, Pa., has opened a branch office at Boston, Mass.

E. F. G. Meisinger has been appointed representative of the railroad department of S. F. Bowser & Co., Ft. Wayne, Ind., for the territory west of the Rocky mountains.

F. B. Marble, who resigned recently as assistant chief engineer of the Michigan Central, has been appointed superintendent of construction for the Siems-Carey Company, Limited, railroad contractors, with headquarters at Mile 53, B. C., via Edmonton, Alberta.

W. W. Broughton, first vice-president of the Pittsburg Coal Company, with headquarters at Minneapolis, Minn., has been made president of the Pittsburg Coal Company of Wisconsin. Mr. Broughton, formerly until March, 1911, was general traffic manager of the Great Northern Railway.

In the list of exhibitors of the Track Supply Association in connection with the Roadmasters' convention, in the issue of September 20, 1912, the name of the National Manufacturers' Company of Waterloo, Iowa, should have read Associated Manufacturers' Company of Waterloo, Iowa, represented by E. C. Cummings.

The Pennsylvania Railroad has ordered two 10-ton derrick barges from the Pusey & Jones Company, Wilmington, Del., two 250-ft. wooden car floats from the Skinner Ship Building & Dry Dock Company, Baltimore, Md., two 250-ft. wooden car floats from the American Car & Foundry Company, New York, for use in the New York harbor.

### American Electric Railway Manufacturers' Association.

The annual meeting of the American Electric Railway Manufacturers' Association was held on Wednesday, October 9, at the Saddle and Sirlain Club adjoining the convention hall. The following were elected members of the executive committee: J. L. Repogle, Cambria Steel Company; C. S. Hawley, Laconia Car Company; Chas. J. Mayer, Electric Service Supplies Company; S. K. Colby, Pierson, Roeding & Company; W. L. Conwell, Transportation Utilities Company; C. C. Pierce, General Electric Company; D. W. Smith, Peter Smith Heater Company; H. C. Evans, Lorain Steel Company. The officers of the association for the coming year will be elected by the executive committee. Secretary McConaughy reported 349 members as against 330 last year; also the fact that the exhibits this year occupied 74,000 net sq. ft. of space.

### TRADE PUBLICATIONS.

PNEUMATIC RAMMERS.—The Chicago Pneumatic Tool Company, Chicago, has devoted bulletin No. 121 to pneumatic rammers, sand sifters, and other foundry equipment.

HAND POWER TRAVELING CRANES.—The Vulcan Engineering Sales Company, Chicago, has just issued a well illustrated circular describing certain of its various types of traveling cranes.

CARS.—The McGuire-Cummings Manufacturing Company, Chicago, has published a handsome cloth bound illustrated catalog describing its various types of cars, trucks, snow plows, sprinklers, etc.

SAWING MACHINES.—The Vulcan Engineering Sales Company, Chicago, has published an illustrated folder on its cold metal sawing machines. These saws can be arranged for direct-connected motor drive.

TIE RENEWER.—The P. & M. Company, Chicago, has issued a well illustrated pamphlet describing the Smith tie renewer and showing the method of operation of the renewer, with photographs of actual work in progress.

BOND WIRE PROTECTORS.—The P. & M. Company, Chicago, has issued a little bulletin describing the placing of bond wires between the splice and the rail, and telling how their method of handling bonding affects the signalman and the trackman.

PROTECTING TELEGRAPH POLES.—The Q. & C. Company of New York has issued a pamphlet describing its patented process

for treating the base of telegraph and telephone poles to arrest decay at the ground line and thereby increase the life of the entire pole.

**CONCRETE BRIDGES.**—The Universal Portland Cement Company, Chicago, has published an attractive little booklet showing illustrations of a number of different highway bridges and giving a brief description of each. This booklet is entitled Concrete Highway Bridges.

**POWER STATIONS.**—The Stone & Webster Engineering Corporation, Boston, Mass., has published a handsomely illustrated booklet on the South Boston Power Station. The illustrations and descriptions combine to give an excellent idea of the magnitude of this plant.

**TUBE EXPANDERS.**—Gustav Wiedeke & Co., Dayton, Ohio, has published bulletin No. 26 on its ideal tube expanders. This bulletin is illustrated and gives full particulars of each type of expander, including the dimensions, weight, expansion, price, and code words for ordering.

**COALING STATIONS.**—The T. W. Snow Construction Company, Chicago, has published a catalog of its railroad coaling stations, which includes illustrations, diagrams and brief descriptions of these structures, and of the automatic reversible hoists designed for use in bucket type coaling stations.

**SWITCHBOARD PANELS.**—The General Electric Company, Schenectady, N. Y., has published bulletin No. 4996, on alternating current switchboard panels for three-phase three-wire circuits of 240, 480 and 600 v., 25 to 60 cycles; and bulletin No. 4995 on direct current switchboards, double polarity, 125, 250, 600 v.

**PNEUMATIC HOISTS.**—The Vulcan Engineering Sales Company, Chicago, has issued a circular describing its Q M S pneumatic hoists. The circular is illustrated and has a table showing size, capacity and weights of the various styles, giving also dimensions and including a list of code words to be used in ordering these hoists.

**LOCOMOTIVE CRANES.**—The Industrial Works, Bay City, Mich., has issued an unusually attractive booklet containing 42 handsome reproductions of photographs showing Industrial Works cranes in operation in heavy work in the construction of the United States Steel Corporation plants at Gary, Ind., and South Chicago, Ill.

**HYDRAULIC ACCUMULATORS.**—The Watson-Stillman Company, New York, has published catalog No. 84, illustrating, tabulating and fully explaining the principal types of accumulators made by this company. A few pages are also devoted to accumulator accessories and to special hydraulic working apparatus, reservoirs, etc.

**APPLIANCES FOR BURNING FUEL OIL.**—The Tate, Jones & Company, Inc., Pittsburgh, Pa., has published a booklet entitled Appliances for Burning Fuel Oil, which discusses oil as a fuel and illustrates and describes its various types of oil burners. Pumping systems for pumping, heating and regulating the oil flow to burners are also described.

**AMERICAN INGOT IRON.**—The American Rolling Mill Company, Middletown, Ohio, has published a 44 page illustrated booklet, entitled Public Opinion on American Ingot Iron. This booklet shows facsimiles of complimentary letters from many users of this product. It discusses corrosion and its causes, and includes many interesting facts about American ingot iron.

**WELDING AND CUTTING.**—The Oxyweld Acetylene Company has issued a well-illustrated booklet entitled "Cutting the Cost," in which are presented descriptions of some of the various ways in which the Oxyweld process is employed. With this process oxygen and acetylene are used to produce a small flame developing a very high degree of heat, which is applied for welding to the edges of the parts to be joined. As the metal is reduced to a molten state fused wire is added, providing a fusion weld. The process is also largely used for cutting wrought iron and steel plates, structural steel work and steel castings. Some of the descriptions and illustrations show the uses of the process in cutting up the wreck of the battleship Maine in Havana harbor, in the removal of the wreck of the Quebec bridge, in making locomotive and car repairs, repairing broken machinery parts, reclaiming defective castings and forgings, and for other similar purposes.

## Railway Construction.

### New Incorporations, Surveys, Etc.

**ASHERTON & GULF.**—According to press reports this company will build an extension from Asherton, Tex., northwest either to Eagle Pass, about 50 miles, or to Del Rio, about 100 miles. It is understood that residents of Carrizo Springs will raise a bonus of \$40,000 in aid of the project. (July 12, page 80.)

**ARKANSAS NORTHWESTERN.**—According to press reports bids are to be asked for in November to build the first section of 15 miles from Bentonville, Ark. The general contract has been given to the Benton County Construction Company, to build the line which is to have a total length of about 35 miles. E. B. Whitcomb, chief engineer.

**BEAUMONT & GREAT NORTHERN.**—See Missouri, Kansas & Texas.

**BRINSON RAILROAD.**—An officer is quoted as saying that an extension is to be built from Waynesboro, Ga., either to Augusta or to Washington and Athens. The company has had under consideration for some time the question of building from Waynesboro to Athens, 105 miles.

**CANADIAN NORTHERN.**—The Canadian board of railway commissioners has approved of the site for a station and track layout at Calgary, Alta. Plans of the buildings to be erected have been submitted to the Calgary city council. A contract has been let to the Northern Construction Company for building the Calgary-Macleod branch, and the board of railway commissioners has approved location plans for the line through Macleod, mileage 102.05 to 104.26.

**CANADIAN NORTHERN PACIFIC.**—According to press reports bids were asked for recently by McKenzie, Mann & Company, Ltd., Vancouver, B. C., for building the Okanogan branches from Kamloops, B. C., to Vernon, to Kelowna and to Lumby, about 131 miles.

**CANADIAN NORTHERN, QUEBEC.**—Application is being made to the board of railway commissioners of Canada for approval of location plans for a line from Rawdon, Que., to St. Donat, Montcalm county, about 40 miles. Surveys have been completed from Rawdon through Chertsey, Ste. Emilie and Notre Dame de Mercie.

**CANADIAN PACIFIC.**—The Forward subdivision of the Saskatchewan division has been extended from Ogema, Sask., west to Viceroy, 25.6 miles.

**CHARLESTON & SUMMERVILLE INTERURBAN.**—Incorporated in South Carolina to build a 22-mile line, also several miles of street railways in Charleston, S. C. J. L. Davis is president, and E. W. Hughes is secretary.

**CHICAGO, MILWAUKEE & PUGET SOUND.**—An officer writes regarding the reports that contracts have been let recently for work on the branch from Hillyer, Mont., northeast to Roy, 26 miles, also on another branch from a point  $4\frac{1}{2}$  miles from Hillyer, up Dog creek to Christiana, about 20 miles, that a contract for the grading work has been given to D. J. Burke, Lewistown, Mont.

**FLINT RIVER & NORTHEASTERN.**—This road has been extended from Ticknor, Ga., southeast to Moultrie, 14 miles.

**GRAND TRUNK PACIFIC.**—The Moncton division has been extended from Skeena River Crossing, B. C., to Sealey, 12 miles.

**GREAT FALLS & TETON COUNTY.**—This company has been incorporated in Montana to build from Power, Mont., on the Great Northern, west and northwest to Choteau, about 30 miles. The names of the incorporators are not given.

**GREAT NORTHERN.**—An officer writes that a contract has been given to A. Guthrie & Co., St. Paul, Minn., to build about 70 miles of the New Rockford-Willeston line, building through North Dakota via McKenzie county to Lewistown, Mont. (September 27, p. 599.)

**GREAT SOUTHERN.**—An officer of this company, which operates a line from The Dalles, Ore., east and southwest to Dufur, 30 miles, writes that work is nearing completion on an extension southwest via Three Springs to Friend, 11 miles. The work is being carried out by the company's men. It is understood that

the line is to be further extended southwest to Juniper Flats, 40 miles from Dufur.

**GREENVILLE & KNOXVILLE.**—This road has been extended from Riverview, S. C., to River Falls, 2.7 miles.

**HUDSON BAY RAILWAY.**—An officer writes that the contract recently let to J. D. MacArthur, Winnipeg, Manitoba, is for building the last section from Split Lake Junction, northeast either to Port Nelson, about 165 miles, or to Fort Churchill, about 245 miles. It has not yet been definitely decided whether Port Nelson or Fort Churchill will be the Hudson Bay terminus of the line. J. D. MacArthur has contracts also to build from The Pas to Split Lake Junction, 253 miles. (October 11, p. 710.)

**LONDON & NORTHWESTERN OF CANADA (Electric).**—It has been announced that the Mackenzie, Mann & Company interests have acquired the rights of this company, which has been authorized to build an electric line from London, Ont., to Sarnia. D. A. Stewart, London, is interested.

**LOUISIANA & PACIFIC.**—See Shreveport, Alexandria & Southwestern.

**MARIANNA & BLOUNTSTOWN.**—An extension has been opened for business from Blountstown, Fla., to Scotts Ferry, 15 miles.

**MISSOURI, KANSAS & TEXAS.**—According to press reports this company has secured the right and property of the Beaumont & Great Northern operating a 49-mile line from Weldon, Tex., via Trinity to Livingston. An extension is to be built to connect with the main line of the M. K. & T. This will give the company a connection over its own tracks with its Trinity-Colmesneil line.

**NEW IBERIA & NORTHERN.**—Train service has been extended from Port Barre, La., to Opelousas, 0.8 miles.

**NIPISSING CENTRAL (Electric).**—The location plans for an extension from Haileybury, Ont., north along the shore of Temiscaninque lake to New Liskeard, five miles, have been approved by the board of railway commissioners of Canada. The Cobalt town council has approved the company's proposal to connect its line with the Temiskaming & Northern Ontario at North Cobalt, and to run its cars over the steam railway tracks to Cobalt station. (March 1, p. 408.)

**NORTH YAKIMA & VALLEY.**—The Zillah branch, extending from North Yakima, Wash., southeast to Granger, 25.2 miles, is now open for freight and passenger business.

**OKLAHOMA, NEW MEXICO & PACIFIC.**—Under this name application will be made in Oklahoma for a charter to build a 50-mile line from Ardmore, Okla., west to a point between Chickasha and Ryan. J. L. Hamon, Ardmore, and John Ringling are said to be interested.

**OREGON SHORT LINE.**—An officer writes that contracts have been given to the Utah Construction Company, Ogden, Utah, for second track work from Kemmerer, Wyo., west to Fossil, 11.86 miles, also for second track work from Renfro, Idaho, west to McCammon, 9.88 miles, and for connecting the present second track between McCammon and Pocatello. The work in Wyoming involves putting up two 80-ft. plate girders, and one 40-ft. plate girder, and in Idaho putting up four 65-ft. plate girder bridges.

**PENNSYLVANIA LINES WEST.**—An officer writes that improvements to be made on the Louisville division of the Pittsburgh, Cincinnati, Chicago & St. Louis, at Indianapolis, Ind., from South street south, include constructing a subway; elevating the present tracks and putting in additional tracks. The average fill will be about 13 ft., and the total filling will be about 150,000 cu. yds. There will be five steel bridges on concrete abutments over streets. The aggregate length of bridges will be 925 ft., measured as single track, and the aggregate length of concrete retaining walls and abutments, exclusive of wings, will be 1,750 lineal ft. There will be one outbound freight station 29 ft. x 936 ft. of brick construction, with concrete foundations and tile roof. This station will have five transfer platforms, each 12 ft. x 916 ft. There will also be one inbound freight station, 60 ft. x 790 ft. of brick construction, with concrete foundations and tile roof, to have four transfer platforms, 12 ft. x 800 ft. Work on the foundation for the outbound freight house and subway is now underway by the company's forces.

The substructure of the subway is to be built this year and will be carried out by company forces. Contract for superstructures not yet let. Bids for the outbound freight house above foundations have been received, and the contract is to be let at once.

**PITTSBURGH, CINCINNATI, CHICAGO & ST. LOUIS.**—See Pennsylvania Lines West.

**PORTLAND, EUGENE & EASTER (Electric).**—This company is said to be making surveys for a line between Goshen, Ore., and the Pleasant Hill country.

**SALT LAKE & UTAH.**—Incorporated in Maine with a capital of \$3,000,000 to build and operate railroads. C. Dyer, of Portland, Maine, is president, and F. M. Orem, of Salt Lake City, Utah, is treasurer. Mr. Orem is also treasurer of the Interurban Construction Company, incorporated to carry on a railroad construction business. E. A. Turner, of Portland, is president of the construction company.

**SHREVEPORT, ALEXANDRIA & SOUTHWESTERN.**—An officer of the Louisiana & Pacific is quoted as saying that this company is relaying 10 miles of branch line with 65-lb. rails.

**SAVANNAH UNION RAILROAD & TERMINAL COMPANY.**—Incorporated in Georgia to build a 14-mile line in Chatham county, Ga. Charles E. Hill, general manager of the Great Eastern Lumber Company, Savannah, is said to be interested.

**WHITE PASS & YUKON.**—An officer writes that this company is now busily engaged in expanding and carrying on extensions, one of them being the extension of the River division service 800 miles from Dawson, Yukon Territory, to Fairbanks, Alaska; the other being a plan under way to install freight boats on the Pacific ocean from Seattle to Skaguay, which would increase the freight carrying distance 1,800 miles, and the distance for transporting passengers and freight, 800 miles.

**WINNIPEG ELECTRIC.**—This company, which owns the Winnipeg, Selkirk & Lake Winnipeg, has secured from the Winnipeg, Man., city council, the right of way of the city's line to Stoney Mountain. Additional land has been secured to connect the company's line with the newly acquired property, and for the extension of the line to Stonewall, 17 miles.

**WINNIPEG, SELKIRK & LAKE WINNIPEG (Electric).**—See Winnipeg Electric.

## RAILWAY STRUCTURES.

**CALGARY ALTA.**—See Canadian Northern under Railway Construction.

**CHATTANOOGA, TENN.**—The Foster-Creighton-Gould Company, Nashville, Tenn., has been awarded a contract by the Nashville, Chattanooga & St. Louis for furnishing and erecting the metal work of a double-track steel viaduct over Running Water Creek. The work will require approximately 2,000 tons of metal work, and the viaduct will be 1,100 ft. long, with a maximum height of 120 ft., and a reinforced concrete ballast floor. The material will be fabricated by the Virginia Bridge & Iron Company.

**CINCINNATI, OHIO.**—Extensive improvements are now nearing completion to the passenger and freight terminals of the Cincinnati, Hamilton & Dayton at Cincinnati. The passenger station, which is of brick construction, having two stories and basement, has been transformed into a thoroughly modern terminal and remodeled throughout. In addition to these improvements the inbound freight house, just west of the passenger station, has been overhauled. The cost of the improvements will be about \$20,000.

**CLEVELAND, OHIO.**—The Pennsylvania Lines have awarded a contract to W. F. Trimble & Son of Pittsburgh, Pa., for a new two-story freight house and office building of brick and steel 32 x 334 ft.

**DECATUR, ILL.**—The Wabash has awarded a contract to C. W. Gindele & Co., of Chicago, for the concrete foundations, brick work and mill work on its locomotive repair shop, to be built at Decatur.

**FARNHAM, QUEBEC.**—According to press reports, the Central Vermont has been authorized by the board of railway commissioners of Canada, to put up a bridge over the Yamaska river near Farnham.

**FLOSSMOOR, ILL.**—The report of the Illinois Central for the year ended June 30, 1912, shows that new passenger stations were built at Flossmoor, Ill., at Metropolis, at Ft. Dodge, Iowa, and at Hammond, La. The passenger stations at Effingham, Ill., and at Holly Springs, Miss., were enlarged and the passenger concourse at Central station, Chicago, was widened and a canopy erected. New freight houses were built at Mattoon, Ill., and at Hammond, La., and combination stations were enlarged or improved at Divernon, Ill.; at Alta, Iowa; at Grayson Springs, Ky.; at Leitchfield, at Marion, at Sturgis, at Red Bay, Ala.; at Vina; at Oxford, Miss., at Way, at Lamar and at McComb. New mechanical coaling plants were built at Carbondale, Ill., at Centralia, at Minonk and at Champaign; also at Ft. Dodge, Iowa. A filter plant was installed at Carbondale, and at West End the reservoir was enlarged. A new mechanical plant, including a machine shop, with adequate machinery, store room, new round house, cinder pit, coaling station, etc., was built at Champaign, Ill. At Ft. Dodge, Iowa, a new engine house, a turntable, a fuel station, and an oil house were installed. A number of new turntables were installed to replace smaller turntables at various places. During the year 1,589 lineal feet of steel and concrete bridges were constructed, replacing timber and pile bridges, trestles and embankment; 1,485 lineal feet of steel and masonry bridges, and 19,771 lineal feet of timber and pile bridges and trestles were rebuilt or replaced by embankments.

**FORT WORTH, TEX.**—Bids are wanted by J. A. Mulholland, county auditor of Tarrant county, Tex., at Fort Worth, until October 23, for the construction of two concrete viaducts, one at Main street, to have a total length of 1,752 ft. 3 in., and the other at West Seventh street, to have a total length of 1,041 ft. Both viaducts are to be built over the Trinity river, within the city limits of Ft. Worth, and will carry tracks for street railways.

**GREEN SPRING, W. VA.**—The Baltimore & Ohio will erect a large steel bridge across the south branch of the Potomac river at Green Spring, on the Cumberland division, and contract has been awarded for the work. The Pennsylvania Steel Company, Steelton, Pa., will erect the steel superstructure, and the Smith, McCormick Company, Easton, has been awarded the contract for the masonry and substructure of the new bridge. The bridge will be of modern design and capable of carrying the heaviest types of motive power and equipment used on the Baltimore & Ohio. The cost of the bridge completed will be about \$100,000, and the weight of the structure will be about 1,500,000 lbs.

**INDIANAPOLIS, IND.**—See Pennsylvania Lines West, under Railway Construction.

**MANLY, IA.**—The Chicago, Rock Island & Pacific is planning to begin work early in 1913 on the erection of a 20-stall round-house, a turntable, cinder pit, machine shops, power house, water plant, coaling station, and division terminal facilities.

**ROCKWOOD, ONT.**—According to press reports, the board of railway commissioners of Canada has authorized the Grand Trunk to build a bridge at Rockwood; also to build a bridge at Sebringville.

**SAN FRANCISCO, CAL.**—The Atchison, Topeka & Santa Fe has bought 30 acres of land on the Oakland estuary, to be used for freight terminal facilities.

**SEBRINGVILLE, ONT.**—See Rockwood.

**TORONTO, ONT.**—According to press reports, the Canadian Northern Ontario has been authorized by the board of railway commissioners of Canada to construct a bridge over the Humber river in the township of York, county of York, at a point 6.32 miles west of Toronto.

**TRAFFIC IN GUATEMALA.**—In 1911 the 421 miles of railways of Guatemala carried 1,187,433 passengers, 252,882 tons of freight. In addition to this freight, the Guatemala Railway hauled during the year 1,240,511 bunches of bananas.

## Railway Financial News.

**ATLANTIC COAST LINE.**—The directors have voted to increase the capital stock by \$6,000,000. Stockholders are to be offered the right to subscribe for new stock at par to the extent of 10 per cent. of their present holdings. Atlantic Coast Line stock is now selling at around 142. The Atlantic Coast Line owns 51 per cent. of the Louisville & Nashville outstanding stock, and the L. & N. is now offering \$12,000,000 new stock at par to stockholders, so that the \$6,000,000 to be raised by the A. C. L. through the sale of its stock will just about pay for the L. & N. stock which it has the privilege of subscribing for. Of the total \$58,162,900 of the Atlantic Coast Line Railroad stock, \$33,000,000 is held by the Atlantic Coast Line Company of Connecticut. It has not been announced whether or not the holding company would increase its stock. See also Louisville & Nashville.

**BOSTON & MAINE.**—Stockholders have voted to issue \$10,663,700 additional common stock and \$7,500,000 20-year 4½ per cent. bonds.

**BEAUMONT & GREAT NORTHERN.**—See Missouri, Kansas & Texas.

**CHICAGO GREAT WESTERN.**—Milton Toole has been elected a director, succeeding A. H. Gillard.

**CHICAGO, ROCK ISLAND & PACIFIC.**—Stockholders have authorized the lease of the Rock Island & Dardanelle. The Rock Island & Dardanelle runs from Dardanelle, Ark., to Ola, 15 miles.

**LARAMIE, HAHN'S PEAK & PACIFIC.**—On October 1 interest payments on the \$1,560,000 first refunding mortgage bonds was defaulted by the receivers. The receivers were appointed on June 10, 1912. The company operates about 112 miles of line running southwest from Laramie, Wyo.

**LOUISVILLE & NASHVILLE.**—Stockholders are offered the privilege of subscribing at par, at the ratio of 20 per cent. of their holdings, for \$12,000,000 new stock recently authorized. The right to subscribe will cease on December 16.

See also Atlantic Coast Line.

**MISSOURI, KANSAS & TEXAS.**—This company has bought the entire \$50,000 stock of the Beaumont & Great Northern. The Beaumont & Great Northern runs from Weldon, Tex., to Livingston, 50 miles, connecting at Trinity with a branch of the M. K. & T., which now has no connection with the main line, but which will be extended to a connection with the main line.

**NEW YORK CENTRAL & HUDSON RIVER.**—The New York Public Service Commission, Second district, has granted the application of the New York Central & Hudson River to issue \$5,500,000 4½ per cent. equipment trust certificates, to be sold at not less than 97. The proceeds of the certificates are to be used for the purchase of 21 locomotives, 20 passenger coaches, 3 dining cars, 8 postal cars, 4,000 box cars, 400 flat cars, 800 gondola cars and 100 ballast cars.

**PHILADELPHIA & WESTERN.**—This company has increased its capital stock from \$4,000,000 to \$6,000,000, and has decreased its authorized funded debt from \$20,000,000 to \$4,000,000.

**ROCK ISLAND & DARDANELLE.**—See Chicago, Rock Island & Pacific.

**STUTTGART & RICE BELT.**—Gordon N. Peay, of Little Rock, has been appointed receiver of this road, which extends from Mesa, on the Rock Island, to Stuttgart, Ark. This action follows a suit filed in the Prairie county chancery court by the Dalhoff Construction Company. The road is 25 miles long.

**WHITE PASS & YUKON.**—We are informed that the press despatch which we quoted in these columns in the issue of September 27, to the effect that the Grand Trunk Pacific would buy the White Pass & Yukon, is entirely without foundation, and that "there are positively no negotiations whatever under way for the transfer of the property." The White Pass & Yukon is engaged in enlarging its property and carrying on extensions. See Railway Construction news.